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REPORT

IN REFERENCE TO THE

CANADIAN PACIFIC RAILWAY

— BY —

SANDFORD FLEMING, C.M.G.,

ENGINEER-IN-CHIEF.

1879.

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REPORT

CANADIAN PACIFIC RAILWAY

5th APRIL, 1879.

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CANADIAN PACIFIC RAILWAY.

REPORT

BY

THE ENGINEER IN CHIEF,

ADDRESSED TO

THE HONOURABLE THE MINISTER OF PUBLIC WORKS,

CANADA.

Canadian Pacific Railway,
Office of the Engineer-in-Chief,
Ottawa, April 5th, 1879.

The Honble. Charles Tupper, C.B.,
Minister of Public Works.

Sir,—I had the honour on the 8th of January last to furnish a report setting forth the progress made in surveying and construction up to the 31st December, 1878.

I now beg leave specially to submit for your consideration the following remarks on the undermentioned subjects, some of them to my mind so important in their character as to claim earnest attention :—

1. The Pacific Telegraph line, with suggestions for completing and operating it.
2. The Georgian Bay Branch and the navigation of French River.
3. The construction of railways west of Winnipeg by private companies.
4. The expediency of laying down a comprehensive scheme of Railways.
5. The physical character of the country and necessity for further information.
6. The early establishment of Colonization Railways in the Prairie Region.
7. The Western Terminus and the route through British Columbia.
8. The establishment of the trunk line between Lake Superior and Manitoba.
9. The cost of the Railway from Fort William to Selkirk.
10. The Contracts entered into.

1.—THE PACIFIC TELEGRAPH LINE, WITH SUGGESTIONS FOR COMPLETING AND OPERATING IT.

As early as 1874, it was considered of primary importance to construct, as speedily as practicable, a line of telegraph through the interior of the country, to connect British Columbia with the Eastern Provinces. Contracts were accordingly entered into with the design of effecting, before the end of 1876, complete telegraphic communication from Fort William, Lake Superior, westerly to the Pacific coast. The original design was that the telegraph should follow the general route of the railway. From Fort William to Ottawa, however, the surveys were incomplete, and on this section it was not possible to construct the telegraph as prescribed by the statute, along the line of railway. Tenders were received but no further steps were taken in respect to this distance.

The telegraph has been constructed complete for operation from Fort William to Edmonton, 1,200 miles. The line, however, has not been brought into use beyond Battleford.

Its operation, generally, has been limited to the distance between Battleford and Fort William, 970 miles and a branch from Selkirk to Winnipeg.

The connection with the seat of Government was obtained via the branch line to Winnipeg, and the lines through the United States.

The section between Edmonton and the British Columbia telegraph system remains incomplete. The contractor undertook to erect 550 miles of telegraph in two years. At the end of four and a-half years, about 80 miles only are completed.

If the importance of a through telegraphic communication between Ottawa and British Columbia, claims the same recognition which, five years ago, it obtained, there should be no further delay in completing the system entirely through Canadian territory.

The section from Fort William to Edmonton, a distance of about 1,200 miles, being ready for use, there remains to be completed the eastern and western connections, viz.:—about 600 miles east of Fort William and 470 miles west of Edmonton.

The statute provides that the telegraph shall be constructed along the line of the Railway after the location is established. On the eastern section the route is not established. On the western section, although the line by the Rivers Thompson and Fraser was adopted last year, that location has not given entire satisfaction, and the desire has been strongly expressed that further explorations be made to determine if a route more generally satisfactory can be found.

East of Fort William, it would be practicable to connect the Pacific Railway telegraph with the telegraph system of Ontario, by submerged cables across Lakes Superior and Huron to Tobermoray, or some other suitable point north-westerly from Owen Sound. The cable would not be continuous, but would probably have intermediate land lines across the peninsula at Sault St. Mary and the Manitoulin Islands.

It has been suggested that the construction of the Georgian Bay Branch Railway could be discontinued, and the money required for that work be applied towards the cost of a Great Territorial Road on the line of railway from Lake Nipissing to the north side of Lake Superior. The amount available by the non-prosecution of this branch will admit of a land line of telegraph being constructed, precisely in the position where it will be of permanent advantage. The line being located for the railway and cleared, the cost of the telegraph itself would be comparatively small, probably not more than $120,000, while the cable line might cost from $400,000 to $500,000. Moreover it may be said, that a cable connection would rather postpone than promote the establishment of the continuous railway from the section under construction north of Lake Superior to Lake Nipissing.

Whatever be the ultimate location of the railway west of Edmonton, if the speedy establishment of through telegraphic communication be desirable, the telegraph may, without further delay, be taken by the route traced to Yellow Head Pass, and thence to the most convenient point of connection with the British Columbia telegraph system in operation, which is itself owned by the Dominion Government.

The arrangements in force for operating the 1,200 miles constructed, are not satisfactory, and frequent complaints have been received with regard to them.

The line is at present operated in three sections under the following arrangements:—

(1.) Fort William to Red River, 410 miles.

The line to be maintained until September, 1883, at the cost of contractors (Messrs. Oliver, Davidson & Co.) The contractors receive $10 per mile per annum for operating. Government messages free. The operating arrangements to cease on six months' notice.

(2.) Red River to Livingstone, 294 miles.

To be maintained and operated until 1st August, 1881, by the contractors, (Messrs. Sifton, Glass & Co.) at the rate of $16 per mile, in all $4,770 per annum. The contractors receiving profits.

(3.) Livingstone to Edmonton, 517 miles.

The contractor (Mr. R. Fuller) to receive $13,000 per annum for maintenance until 15th July, 1881. There is no arrangement for operating; the contractor receives all that the line earns. The tariff of charges is considered exorbitant.

There are two modes by which the Pacific telegraph line may be rendered useful to the public—

First.—By completing the eastern and western sections in the manner indicated, and by operating the whole directly under a Department of the Government, as in Great Britain, at a uniform low scale of charges.

Second.—By inviting proposals from existing telegraph companies, or companies that may possibly be formed, to purchase or lease the 1,200 miles constructed from Fort William to Edmonton. The company to complete the whole line from Ottawa to the Pacific coast, and to operate it at fixed uniform charges, not higher than the present tariff in Ontario and Quebec.

Should it not be considered expedient to follow either of the courses submitted, I have respectfully to recommend that steps be taken to regulate the charges on the line now in operation from Fort William to Edmonton. That portion east of Selkirk in particular will, in a short period, be in constant requisition. At present it is the only means of communication across the country it traverses, and all parties connected with the construction of the railway, will require to use it constantly. Indeed the whole of the line from Fort William to Edmonton will be of undoubted service to the public if its operation be placed on a satisfactory basis.

2.—THE GEORGIAN BAY BRANCH AND THE NAVIGATION OF FRENCH RIVER.

The Canada Central Railway is being constructed under a subsidy to a point near the south shore of Lake Nipissing. At that point the line known as the Georgian Bay Branch begins, and it extends westerly, south of Lake Nipissing, then follows the French River to Cantin's Bay. Its length is 50 miles. At Cantin's Bay the navigation of Lake Huron is not reached, but from this point the French River can be rendered navigable to its mouth by a single lock and by dredging the channel where necessary.

A proposal has been made to make the whole of the French River navigable from Lake Huron to Lake Nipissing, and abandon the construction of the Georgian Bay Branch Railway.

I have examined into the feasibility of this project, and surveys have been made in order to determine the most eligible point for connecting the Canada Central Railway with Lake Nipissing.

The contract for constructing the Georgian Bay Branch was made in August, 1878. Up to this date, the work executed by the contractors has been confined to clearing, so that the expenditure on the line of railway has been of limited amount.

About twenty years ago surveys of French River were made by Mr. T. C. Clarke, under the authority of the late Province of Canada, with the view of establishing the practicability of forming an artificial navigation from Lake Huron to Montreal, by way of Lake Nipissing and the River Ottawa, and it was then proposed to raise the level of Lake Nipissing some ten feet to render the scheme practicable.

The immediate object was the reduction in the work of cutting through a wide ridge between Lake Nipissing and the Matawan, a branch of the Ottawa, and in order to make Lake Nipissing the summit water supply.

Accordingly, in the survey recently made the raising of the level of Lake Nipissing has been kept in view, so as to create no obstacle to completing the Ottawa Canal Scheme in future years should traffic demand it.

The survey has established that the best point for touching Lake Nipissing is at South-east Bay where excellent shelter and deep water are found with an open channel. The shore can be approached by railway without difficulty, and the line may be extended thence towards Lake Superior without interfering with the project of raising the level of Lake Nipissing.

It will require more extended examinations than have yet been made to arrive at a comparative estimate of the cost of making a canal or a railway to Lake Huron. Mr. Clarke estimated the cost of the works on French River at less than $900,000, but in this he appears to have made no provision for harbour purposes. Mr. Walter Shanly, who, in 1863, revised Mr. Clarke's report, formed the opinion that the work was under-estimated.

As far as the information which I possess warrants me in forming an opinion—and the opinion is not definite—I consider that, taking the prices of work at this date, we are warranted in adding 50 per cent. to Mr. Clarke's figures, in order to obtain a rough approximate of cost. By this process the cost may be named as not far from $1,400,000.

The estimated cost of the Georgian Bay Branch Railway, equipped with rolling stock, including works necessary to connect it with the navigable waters of Lake Huron, is placed at $1,900,000. Accordingly, so far as we have the means of judging, it may be said that it would involve a less expenditure to form an artificial navigation from Lake Huron to Lake Nipissing than to establish the Branch Railway.

It has been suggested that in place of constructing the railway or canal to Lake Huron, the amount required for either work should be expended in constructing a portion of the main line of the Pacific Railway in the direction of Lake Superior from the proposed terminus of the Canada Central, on South-east Bay. But I can see no immediate object to be gained in establishing a fully appointed railway to a point in the wilderness fifty miles north-westerly from South-east Bay. It seems to me that the more prudent course would be to expend the estimated cost of the work, or a less sum, in establishing a great Territorial Road on the site of the main line of the Pacific Railway from Lake Nipissing to the north side of Lake Superior.

This estimated cost of the Georgian Bay Branch Railway, fully equipped and provided, is $1,900,000. Of this amount the existing contract for bridging and grading is about $800,000. The latter or a smaller amount might at present be judiciously expended on a Territorial Road, in clearing the line and in carrying out such works of ditching and grading on the site of the railway as are ordinarily executed on the common waggon roads of the country. This policy presents itself to my mind as prudent, and as suggested by the necessities of the situation.

The formation of such a road will establish the great national Railway on a continuous line from Manitoba to Ottawa. Some years hence it can be completed, as circumstances may dictate, when the traffic from the north-west warrants the expenditure, or the public interests demand this railway connection between the central and eastern portions of the Dominion.

Moreover, the course recommended to be followed will admit of the immediate construction of the overland line of telegraph. It will pierce for hundreds of miles a roadless forest, and will extend to lumbermen and mineral prospectors facilities for carrying on their operations; and it will open up the means for colonizing such portions of an untrodden wilderness as may be found capable of settlement.

3.—THE CONSTRUCTION OF RAILWAYS WEST OF WINNIPEG BY PRIVATE COMPANIES.

Applications are now being made to Parliament for Private Bills, giving authority to companies to construct railways in various directions in Manitoba and the North-West Territories.

A question of the greatest possible importance is thus brought into prominence to claim the serious attention of the Government.

In my humble judgment it will prove to be a grave mistake if railway companies receive the necessary powers to establish lines as they have been constructed in other parts of Canada; without forecast; without due consideration of the actual requirements of the country as a whole; without regard to a systematic arrangement; without, in any way, recognizing the principle that, in whatever respect it be viewed, a railway, whatever its length or position, should be considerered as an integral portion of a whole system.

I refer more particularly to the Province of Ontario. Here there has been no regard for any principle of practical economy, by which a general railway system, as a whole, should be mapped out.

The experience gained in Ontario, in this respect, establishes the necessity of avoiding, on an infinitely larger scale, the mistakes that have been unfortunately committed in that portion of Canada bordered by the lakes. No part of the public treasury should be expended in the construction of lines of railway in the North-West, conceived at hap-hazard, and suggested rather by individual and local considerations than by broad public policy.

If public money should not be so used, it is perfectly clear that Parliament should not give authority to private companies to expend borrowed capital in an equally unwise manner.

The future railway system of the whole unoccupied territory will undoubtedly demand, sooner or later, an expenditure of many hundreds of millions of dollars; and from whatever sources the enormous capital may be obtained, it must be obvious to the least reflecting mind that it should be wisely expended, so that, as far as practicable, while the public interest is advanced, all possible loss to the investor should be guarded against.

If the railways of Ontario had to be established *de novo*, a careful study of the requirements of that Province would enable any intelligent engineer of ordinary experience to project a new system, which at one-half the cost would far better serve the public, would meet every demand of traffic, would more fully satisfy every expectation, and which would not result in disappointment and loss to those who have been induced to invest their means in that which has proved, to many, to be unprofitable undertakings.

The railways of Ontario have cost, according to official returns, nearly one hundred and eighty millions of dollars. If they could have been constructed for one-half the cost, the other half of this enormous sum, $90,000,000, may be assumed to be a wholly unnecessary outlay. If a well considered and less costly system would have equally met the wants of Ontario, the excessive expenditure can only be considered as superfluous, and so much of it as remains permanently unremunerative as hopelessly wasted. If public money, the public debt might have been so much the less, or other interests might have been served and developed to the extent of the unwise expenditure. If private money, obtained from parties at a distance, on fair promises, or on prospects represented as encouraging, there is staring the investors in the face the deplorable and unimpugnable fact that much of it will be absolutely lost.

It is to be feared that the same policy extended to the North-West, will end in like consequences, but on a ten-fold greater scale. The greatest possible care should therefore be taken to render such results impossible.

I conceive that the prudent course will be not to allow the passage of Private Railway Bills for Manitoba and the North-West, until a general railway scheme be deliberately and carefully matured.

4.—THE EXPEDIENCY OF LAYING DOWN A COMPREHENSIVE SCHEME OF RAILWAYS.

I have felt it my duty, as far as practicable, on more than one occasion to draw attention to this extremely important consideration. In previous reports I have expressed the opinion that not simply one railway to connect the Atlantic and Pacific coasts will be required, but that hereafter, a vast breadth of country will call for the establishment of a complete and elaborate system of main and subsidiary lines. Will it not be the true policy, to meet this contingency and lay down a broad, general system which will satisfy public requirements ? Is it not in fact an imperative duty to devise a scheme of railways and highways for the whole territory, which in the best possible manner will meet the wants of the future, with the least expenditure of capital in construction ? A system which, when established, can be cheaply and efficiently operated.

I deem it proper to express the opinion which has firmly forced itself on my mind, that the Government should control the location, not of the Trunk lines only but of all lines.

Having constantly in view the advantageous settlement of the more important fertile tracts of territory, the great leading lines should not be unnecessarily lengthened or diverted from the most suitable location in order to meet some merely sectional want or subserve individual advantage.

The subsidiary railway system should not be left to chance, or be given over to private control. All lines should be conceived in the interest of the whole system and the whole country. A railway and road system of the entire habitable territory should be designed so as to meet, in the best possible manner, the future requirements of the country and its future occupants. Each line of communication should be in the right place and of the proper character; and whenever constructed, each link should be established so as to form a part, ultimately, of a general system.

The opportunity now presents itself of establishing the traffic communications of a vast and naturally rich country, on a sound, economic basis. If the opportunity be neglected or evaded, it will never again recur.

It is, therefore, of the first importance that the Government should control the location and construction of all lines, so as jealously to guard that the streams of traffic that will be created will not be diverted from Canadian channels; and at the same time to exact that no railway shall be established which shall not aid in the settlement and prosperity of the country; and that no line shall interfere with another, or encroach on the territory another line has been constructed to serve.

If the opportunity now presented of establishing a railway system on sound principles be allowed to pass without laying down a wise policy, it will not be difficult to predict the results. The evil effects of neglect will not end with this century. On the other hand, if the true interests of the country be consulted and the proper policy be adopted, Canada will enjoy the beneficial effects for all future time.

The policy followed in this matter will in no small degree determine the future of the vast territory of cultivable land which has recently come under the control of Canada, and it will affect, for good or for evil, millions of British subjects. There are two classes of men to be considered—the investor and the settler. Naturally we look to the Mother Country for some of its surplus capital to aid in establishing our great continental highways. Is it not incumbent on us, as far as we can, to make the investment of that capital safe and profitable? By opening up this fertile territory we provide, on British soil, an outlet for the many who are crowded amid a redundant population. We find employment for those who suffer from enforced idleness, and we open up the prospect of prosperity to all who are willing to wait for the certain reward of patient toil, frugality and industry. There will no longer be need for such to turn to a foreign soil, however hospitable it may be. The one change necessary will be simply that of locality. To the struggling man of the old world, who has strength and courage, we can offer the means of making for himself a home. To all such we can offer land to till that will yield a generous reward to labour, but that land is far in the interior of the continent. It must first be made accessible and the means provided for carrying to market what the soil will produce. Moreover in laying down the avenues of traffic which the settlement of the land will necessitate, we should take every precaution to keep the country unburdened by a weight of debt which would bear heavily in any quarter. If, on the one hand, we feel called upon in the interests of the whole Empire to open up the vast territory for the millions who are to occupy it, on the other hand, it is clearly our duty to follow the course which will accomplish this result in the most satisfactory manner.

Accordingly I have respectfully to recommend that the necessary steps be taken to prepare a scheme of railways calculated to meet, in the most economical and efficient manner, the future requirements of the territory as far as they can now be foreseen.

5.—THE PHYSICAL CHARACTER OF THE COUNTRY AND NECESSITY FOR FURTHER INFORMATION.

I am deeply sensible of the weighty responsibilities and the difficulties inseparable from this undertaking. In designing a general scheme of lines of communication for so vast a field, it will be necessary in the first place to have correct information of the general character and natural resources of every portion of the whole territory; and it must be carefully examined and generalized and its merits and possibilities earnestly weighed.

I have endeavoured to collect all known information respecting the country within the limits of the Prairie Region. To make it easy of reference, the whole region has been subdivided into blocks, bounded by each separate parallel of latitude and longitude. I have placed side by side the descriptions of scientific travellers and all statements made on reliable authority which are available. Thus all facts collected have been systematically arranged, and the result is set forth in the appendix. A map has also been prepared on which an attempt has been made to indicate generally the character of the soil, separating that of more or less value from tracts which are comparatively worthless.

It will be seen that much yet remains to be discovered respecting large areas, and it is this information which I suggest should be obtained in the coming season by careful explorations of the sections where our knowledge is deficient. This or some other similar method of systematically arranging the facts as they are collected can alone give moderately correct ideas of a country so vast in its dimensions. Some misconception, I fear, has already arisen respecting the character of portions of the Territory. Large tracts have been declared worthless on very slender data, and equally extensive areas have been pronounced to be of the greatest fertility on insufficient grounds.

The course I suggest will dispel all erroneous opinions. Moreover correct information is indispensable to enable us to mature a scheme of colonization railways for the ultimate development of every considerable tract of cultivable and habitable land.

6.—THE EARLY ESTABLISHMENT OF COLONIZATION RAILWAYS IN THE PRAIRIE REGION.

As it will not be possible to mature a proper scheme of railways for the whole country until more complete information is gained and as the settlement of vacant lands will in the meantime be proceeded with, I beg leave to submit for your consideration the following regulations and conditions which in view of the ultimate establishment of colonization railways, should I think be at once enforced

I. That in all free grants for homesteads, the right of way for railway track, (main lines or branches) space for snow-fences, land for stations and approaches from either side, be reserved and that no compensation be payable to the owner or occupant of the homestead.

II. That in disposing of farm lands by sale, the same reservations be made. The compensation to be reckoned at the original price per acre which the purchaser may have paid the Land Department of the Dominion.

III. That in the event of any branch lines being undertaken by private companies the following provisions be enacted.

(1.) That the location be approved by the Government and determined by Order in Council.

(2.) That in all Bills providing for the incorporation of companies for the construction of railways, it be enacted that the powers granted do not take effect until the company has subscribed sufficient capital, or obtained sufficient municipal assistance, or otherwise satisfied the Government of their having acquired ample resources to complete and equip the length of line they may have undertaken, or until a proclamation be issued authorizing them to proceed.

(3.) That in all Bills, as above, the Government shall reserve the right to acquire the railway at ten per cent. above its actual cost, not including any assistance granted by the Government in the first place.

7.—THE WESTERN TERMINUS AND THE ROUTE THROUGH BRITISH COLUMBIA.

During last Session of Parliament I was called upon to express my views with regard to the question of a terminus on the Pacific coast and the location of the western end of the line.

I submitted the opinion that it would be desirable to gain full and complete information regarding a northern route by Peace or Pine River, and the vast territory through which a northern route has been proposed, with respect to which little is now known.

The Government, however, deemed it essential that construction should commence without further delay in British Columbia, and I was directed to state the route, which under the circumstances, I would advise should be placed under contract.

Accordingly, I recommended that if no postponement for further examination could be admitted, and if the immediate commencement of the railway was imperative, that the choice should fall on the route by the Rivers Thompson and Fraser to Burrard Inlet.

I submitted the opinion, that more than one line through Canada to the Pacific might ultimately be called for; that as far as colonization of the vast central territory was concerned, it was of little consequence which was first constructed, but that the line which could be most speedily established and which would best subserve the general interests of the Empire, was entitled to the preference.

Much has been said for and against every route that has been projected. But on carefully considering the engineering and commercial features in each case, the conclusion was forced upon my mind that the Railway itself would be least difficult to construct, that when established it would be easiest operated and that general interests would be most consulted by following the route to Burrard Inlet.

The route to Burrard Inlet was chosen and tenders for the construction of the work, between Yale and Lake Kamloops, were invited, but nothing further has been done.

It cannot be said that the selection of Burrard Inlet as a terminus has given general satisfaction in British Columbia. On the contrary, a claim has been advanced in that Province that another route and terminus are preferable. It is therefore to be considered if additional explorations should be made, and more complete information obtained with regard to the northern country; so that it may be definitely determined if a route more desirable can be found.

Accordingly, I suggest that the unexplored region, lying between Fort Connelly and Fort McLeod, in British Columbia, and those large tracts of vacant territory east of the Rocky Mountains in the latitude of Peace River, which have never yet been traversed by scientific travellers, be explored and accurate data obtained respecting the feasibility of a railway through that region to the Pacific coast.

8.—THE ESTABLISHMENT OF THE TRUNK LINE BETWEEN LAKE SUPERIOR AND MANITOBA.

I have always attached great importance to the endeavor to secure the best location attainable for the railway. I have elsewhere described the efforts which have been made from the commencement of the survey, to obtain a line favorable for cheap transportation.

In my report of January 26, 1874, the subject was fully discussed. I then said:—

"One of the questions which will undoubtedly force itself on public attention when the Prairie Region begins to raise a surplus for exportation, will be the cheap transportation of products to the east. Looking to this view of the question, the importance of a location which will secure the lightest gradients in an easterly direction is manifest.

"The gradients and alignments of a railway have much to do with its capacity for business, and the cost of working it. It is well known that by attention to these features, in locating a line, it is quite possible, in some cases, to double the transporting capacity of a railway, and very largely reduce the cost of conveying freight over it.

"That portion of the Canadian Pacific Railway between Red River and the navigable waters of Lake Superior, is precisely one of those cases where the utmost attention should be paid to its engineering features. The reduction of the cost of transportation on this location to the lowest figure is a question which affects the future of the country, as upon it, to a large extent, depends the settlement of the western prairies.

"The more this portion of the railway can be made to convey cheaply the products of the soil to the navigation of the St. Lawrence, the more will the field be extended within which farming operations can be carried on with profit on the fertile plains.

"The information obtained suggests that it will be possible to secure maximum easterly ascending gradients between Manitoba and Lake Superior, within the limit of 26 feet to the mile, a maximum not half so great as that which obtains on the majority of the railways on the continent.

"I think the line should be located so as to have the best possible alignment, with no heavier gradients than the maximum referred to. But the importance of securing the benefits of an unbroken steam communication at the earliest possible moment are so great that I consider that it would be advisable, in the first instance, to construct the cheapest possible line. While adhering to the permanent location in the main, I would, with a view of accomplishing the desired object, recommend the construction of a cheap temporary line, avoiding for the present all costly permanent works that would retard its completion. In order to gain access to the country as speedily and cheaply as possible, it might indeed become necessary to overcome special difficulties by adopting temporarily, for short distances, deviations from the true location with heavy undulating gradients and sharp curvature. I have no reason, however, to think that this expedient would frequently be required. I am satisfied that for the greater part of the distance between Lake Superior and Manitoba, the permanent location may be substantially adhered to."

The whole of the railway between Fort William and Selkirk, in length 410 miles, is now under contract. It is with no little satisfaction that I am enabled to point to a table of the gradients which have been definitely established in this length. Under the contracts which have been entered into, these favorable gradients are to be carried into execution without having recourse to the temporary expedients which I thought necessary to suggest five years ago.

Summary of Gradients, Fort William to Selkirk.

Ascending Easterly.	Feet per Mile.	No. of Miles.	
Rise ·10 to ·20 per cent..................about	5 to 10	38·52	
do ·20 to ·30 do	10 to 16	17·11	
do ·30 to ·40 do	16 to 21	42·97	
do ·40 to ·50 do	21 to 26·4	80·11	178.71
Level..		108·06	108.06
Ascending Westerly.	**Feet per Mile.**	**No. of Miles.**	
Rise ·10 to ·20 per cent................about	5 to 10	28·51	
do ·20 to ·30 do	10 to 16	10·91	
do ·30 to ·40 do	16 to 21	9·74	
do ·40 to ·50 do	21 to 26	12·83	
do ·50 to ·60 do	26 to 32	6·82	
do ·60 to ·70 do	32 to 37	10·65	
do ·70 to ·80 do	37 to 42	12·76	
do ·80 to 1·00 do	42 to 52·8	31·01	123.23
Total miles..............................		410·00	410.00

In determining the gradients the rule has been laid down to equate them with the curvature, so that when sharp curves were called for by the physical features of the country, the inclinations of the line would in those cases be proportionately reduced.

The practical effect of a sharp curve on a maximum gradient is to make the gradient heavier by reducing the effective power of a locomotive making the ascent, thus preventing the passage of full loaded trains over the line. The object has been, whatever the curvature, to secure a degree of inclination which in no case would exceed, on tangents, 26·4 feet per mile ascending easterly, or in the direction of heavy traffic. The contract profiles of the line over the 410 miles from Fort William to Selkirk establishes that this object has been substantially secured. Only at one point (eighteen miles out of Fort William) has the locating engineer neglected to enforce this rule. I greatly regret that such is the case as it will involve an expenditure to remedy the defect greater than would have been called for in the first place, when the cost would have been comparatively trifling.

With the exception referred to corrected, the portion of the Pacific Railway between Lake Superior and Manitoba is thus finally established with extremely favorable engineering features, and it may be claimed that when completed under existing contracts, it will be available for conveying the products of the soil from the Prairie Region to Lake Superior, at the cheapest possible rates.

As this portion of the Pacific Railway must, for a long time to come, form the great outlet of much of the Prairie Region, the favorable character for cheap transportation which has been secured for it cannot be over-rated. Indeed upon this important condition very largely depends the successful settlement of the vast fertile plains and the permanent advantage of the future settlers.

9. THE COST OF THE RAILWAY FROM FORT WILLIAM TO SELKIRK.

I beg leave to submit a closer approximate estimate of the cost of the portion of the line from Fort William to Selkirk than hitherto has been practicable.

Estimate.

Grading, bridging, tracklaying and ballasting, under existing contracts, say	$12,000,000
Rails and fastenings	3,000,000
Rolling stock station and terminal accommodation, engineering and contingencies	3,000,000
Total Estimated Cost	$18,000,000

In this Estimate I have made allowances for necessary Station and Terminal services, and also for an equipment of Rolling Stock. The latter on the same scale as on the Intercolonial Railway.

This brings the approximate cost, as far as it can now be ascertained, in round figures to eighteen million dollars for the whole 410 miles, averaging close on $44,000 per mile. The estimate is somewhat higher than was expected; the increase is owing to the extremely rugged and rocky character of the country traversed east and west of Rat Portage. The average cost reckoned by sections, ranges from $27,210 to $83,059 per mile. But for the rocky district covered by contracts Nos. 42 and 15, the average per mile would have been $31,390. The variable character of the country traversed by the line and the difficulties met on each of the six contract sections may be judged from the following calculation of averages:—

Estimated Average Cost per Mile by Sections.

		Length.			Per Mile.
Contract	No. 13	32·60	miles,	— average	$28,626
do	No. 25	80·24	do	do	32,087
do	No. 41	118·03	do	do	34,387
do	No. 42	66·48	do	do	80,364
do	No. 15	36·27	do	do	83,059
do	No. 14	76·38	do	do	27,210
Average for the whole		410·00	miles		$43,902

10.—THE CONTRACTS ENTERED INTO.

The several contracts for the supply of material or the execution of work to the present date, number in all forty-two; of these, Nos. 1 to 31, inclusive, were referred to in my report of February, 1878; and described (p. 383) in an Appendix.

Since that date the following have been entered into:—

Contract No.	5a	For extension of Pembina Branch from St. Boniface to Selkirk.
do	32a	For the erection of station-houses, Prince Arthur District.
do	33	For grading, bridging and track-laying, Pembina Branch, from St. Boniface to Emerson.
do	34	For transportation of rails to Manitoba.
do	35	For furnishing spikes.
do	36	For supplying ties in Manitoba.
do	37	For the Georgian Bay Branch.
do	38	For converting Neebing Hotel into offices.
do	39	For the transportation of rails from Esquimalt and Nanaimo to Yale, B.C.
do	40	For the erection of Engine-house, at Selkirk.
do	41	For grading, ballasting and track-laying, English River to Eagle River (Tender A).
do	42	For grading, ballasting and track-laying, Eagle River to Keewatin (Tender B).

A description of these several contracts, with rates and prices, the amounts paid to 31st December last, and an approximate estimate of the expenditure envolved, will be found in the appendix.

I have also attached my report on surveying operations and construction for the past year.

I have the honor to be, Sir,

Your obedient servant,

SANDFORD FLEMING,

Engineer-in-Chief.

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APPENDIX No. 1.

THE PHYSICAL CHARACTER OF THE PRAIRIE REGION OBTAINED FROM AUTHENTIC SOURCES.

The Prairie Region has been arbitrarily defined in previous reports as extending from the eastern boundary of British Columbia to a line drawn northerly and southerly from Lake Winnipeg. This great central area of Canada is not all prairie, but a considerable portion of it, especially towards the south, is of a prairie character; in other parts much of the Territory consists of woodland. It is, however, held convenient to retain for the whole extent the term of 'Prairie Region.'

The information in the following pages, compiled under instructions from the Engineer-in-Chief, by Mr. Thomas Ridout, C.E., is designed to embrace all important facts found on record, respecting the physical characteristics of this Territory.

It is not claimed that the accompanying map is absolutely correct; an attempt has been made simply to show all the routes followed by scientific travellers, and to distinguish the general character of the soil, as described by them, and set forth in the following pages. The portions of the country left untinted on the map, so far as known, have not been visited by Explorers, and no definite knowledge of them has yet been obtained.

EXPLANATORY NOTE.

The whole Territory is divided into sections, each section one degree of Longitude in breadth by one degree of Latitude in length.

The numerals in the margin, in a fractional form, thus $\frac{59}{100}$ indicate the particular section in each case. The numerator referring to the Latitude and the denominator to the Longitude.

Thus "59" means the space lying between the 59th and 60th parallels of Latitude, while "100" refers to the space between the 100th and 101st meridian.

The numbers printed in red on the accompanying map indicate the several sections.

FROM THE 100TH TO THE 120TH MERIDIAN, AND BETWEEN THE 59TH AND 60TH PARALLELS OF LATITUDE.

$\frac{59}{100}$	Nothing reliable known.
$\frac{59}{101}$	Nothing reliable known.
$\frac{59}{102}$	Nothing reliable known.
$\frac{59}{103}$	Nothing reliable known.

$\frac{59}{104}$ **Nothing reliable known**

$\frac{59}{105}$ **Nothing reliable known.**

$\frac{59}{106}$ **Nothing reliable known.**

$\frac{59}{107}$ **Nothing reliable known.**

$\frac{59}{108}$ **Nothing reliable known.**

$\frac{59}{109}$ **Nothing reliable known.**

$\frac{59}{110}$ **Nothing reliable known.**

$\frac{59}{111}$ THE SLAVE RIVER flows to the north through the centre of this section, draining the waters from Athabasca Lake and Peace River into the Great Slave Lake, down the Mackenzie River to the Arctic Ocean.

The following information is limited to the country bordering on the river which is the line of travel generally followed :—

Richardson. Arctic Search Expedition, Vol I., p. 137 and 148.

"Granite knolls show themselves at frequent intervals on the banks of Slave river. In several places ledges of rock cross the river and form rapids. Limestone cliffs also appear." No description is given of the interior of this country.

"At Salt River, a tributary of Slave River, about 100 miles north of Fort Chepewyan, seven or eight copious salt springs deposit, over a clayey plain, much pure common salt."

$\frac{59}{112}$ The Peace River touches the south-west corner of this section. See section $\frac{58}{112}$.

$\frac{59}{113}$ The Peace River crosses the south-east angle of this section. See section $\frac{58}{113}$.

$\frac{59}{114}$ **Nothing reliable known.**

$\frac{59}{115}$ Nothing reliable known.

$\frac{59}{116}$ Nothing reliable known.

$\frac{59}{117}$ Nothing reliable known.

$\frac{59}{118}$ Nothing reliable known.

$\frac{59}{119}$ Nothing reliable known.

FROM THE 100TH TO THE 120TH MERIDIAN, AND BETWEEN THE 58TH AND 59TH PARALLELS OF LATITUDE.

$\frac{58}{100}$ Nothing reliable known.

$\frac{58}{101}$ Nothing reliable known.

$\frac{58}{102}$ Nothing reliable known.

$\frac{58}{103}$ Nothing reliable known.

$\frac{58}{104}$ Nothing reliable known.

$\frac{58}{105}$ Nothing reliable known.

$\frac{58}{106}$ Nothing reliable known.

58/107 Nothing reliable known.

58/108 Nothing reliable known.

58/109 Nothing reliable known.

58/110 **The River Athabasca** flows into Athabasca Lake in this section, and is on the route travelled by Sir Alex. Mackenzie and others to the Arctic Ocean *viâ* the Mackenzie River, and to the Pacific *viâ* Peace River.

Sir Alex. Mackenzie.

In the journal of his celebrated travels in 1792, and following years, referring to this place, says that "'Athabasca' in the Knisteneaux language implies a flat, low, swampy country."

Sir John Richardson, Arctic Search Exp., Vol. 1, *p.* 132-133.

Lake Athabasca is estimated by Capt. Lefroy to be 600 feet above the sea.

"Much of the country in the immediate vicinity of Chepewyan is composed of rounded knolls of granite nearly destitute of soil, and many of them smooth and polished. These rocks extend along the north shore, and rise in the interior to a height of 400 to 600 feet.

Plumbago of excellent quality has been found on the shores of this lake.

A delta, intersected by several channels, exists at the junction of Peace River with Athabasca Lake and its outlet.

Macoun Geol. Rep., 1875-76, *p.* 91.

In writing of the country at the mouth of the River Athabasca, states that for 25 miles south of lake the land is from 2 to 6 feet above the water, and is subjected to floods.

"All this immense delta, including Lakes Claire and Mamawa and their bordering marshes, and all that part of the Peace River Valley below Peace Point may be called a delta, or the Delta of the Rivers Peace and Athabasca.',

58/111 *Macoun Geol. Rep.*, 1875-76, *p.* 168 *and* 165.

The Arthabasca flows northerly through the eastern portion. Mr.Macoun,who travelled up the river in a canoe, states that above the Delta, the true bank of the river, about 12 feet high, was composed of red sand, and clothed with a forest of Banksian pine and aspen, the former being most conspicuous.

The width of river is from 250 to 300 yards. The river at certain periods of the year adds new material to the land along its margin, and thus builds up its banks. This seems to be of constant occurrence on Peace and Arthabasca Rivers,after entering the Delta. Willow, Balsam, Poplar and Spruce make up the forest in the above order according to the age of the land. At about 50 miles from the Lake the banks rise to 40 feet above the river, and the forest here is of Banksian Pine and Aspen. The opinion is expressed that the eastern bank of the river here is useless for agricultural purposes, as the Banksian Pine always indicates a poor, sandy soil. The Islands have rich soil and are well suited for hay and vegetables.

FORT CHIPEWYAN.

The vicinity shows glaciated, laurentian rocks, with small growth of Banksian Pine. At French Mission, two miles from Fort, the soil is poor, a mixture of sand and humus, but every thing planted seems to flourish.

58/112 The Peace River traverses the northern portion of this section, and passes through the Delta, as described in section 58/110.

58/113 *Macoun Geol. Rep.* 1875-76, *pp.* 162-163.

RAPID BOUILLÉ PEACE RIVER.

"Fine white gypsum crops out, and continues as the lowest rock in the section for the next 20 miles." After passing the rapid the river is more confined, the islands less numerous and the bank higher.

58/114 *Sir Alex. Mackenzie.*

FALLS OF PEACE RIVER.

The river here 400 yards broad; falls 20 feet high. The country from mouth of river to falls is low, and except in a few open parts covered with grass, is clothed with woods. Where the banks are low the soil is good, and where elevated display face of yellowish clay. On the line of falls on either side of river very extensive plains are said to exist, which afford pasture for herds of buffalo.

Macoun Geol. Rep., 1875-76, *pp.* 88-89, 161.

At the Little Red River "the country is not more than 50 feet above the river, and presents the appearance of a vast plain, extending to the north to the Cariboeuf Mountains, said to be 40 miles distant."

The falls of the Peace River are a short distance above the mouth of Little Red River. "At present (15th August) the fall is 15 feet, but at high water cannot be half as much."

"16th August, vegetation indicates even warmer climate than at Fort Vermilion." "Summer frosts never do any harm here, and soil is of first-class quality."

"Between Little Red River and Rapid Bouillé, country along bank seems to be low, alluvial plains with soil of surpassing richness."

58/115 *Macoun Geol. Rep.*, 1875-76, *p.* 160.

FORT VERMILION TO LITTLE RED RIVER.

"The river is over 1,000 yards in width," becoming wider and filled with islands, and it is often difficult to tell its breadth.

58/116 *Macoun Geol. Rep.*, 1875-76, *p.* 159.

Fort Vermilion.

The soil is of the very best description, evidently alluvium, but depth not determined; on immediate bank of river, subsoil is of clay and gravel, often of a reddish colour. About ½ mile from the river the land rises about 50 feet with increased luxuriance of vegetation. Although 2° north of St. John, barley and vegetables were much further advanced. Barley sown on 8th May was cut 6th August, having been in the ground just ninety days; grains large and of beautiful colour. Turnips and early rose potatoes large, with indications of heavy crops. The whole country round this point is a plain, elevated from 50 to 100 feet above the river. From frequent enquiries as to character at distance from river, it is believed to be exactly like that seen at Fort Vermilion. The country intervening between this and the Cariboeuf Mountains, seemed level or to slope gradually up towards mountains, and as far as eye could see was covered with aspen forest with occasional groups of spruce. "No frosts had occurred at Vermilion since May; often whole seasons pass without frost from early in May till late in October."

Peace River is here over 3,000 feet wide.

58/117 The Peace River traverses the southern and eastern portion of this section. All travellers through this region appear to have followed the river, and their observations are confined to the immediate banks.

Sir Alex. Mackenzie.

In this section the "Old Establishment," probably old Fort Vermilion, was situated. Here Sir Alex. Mackenzie wintered in 1792-3, and consequently had a good opportunity of knowing the country in this quarter. He describes the river banks in this locality as being 30 feet higa. "On either side of the river are extensive plains, and opposite our present situation are beautiful meadows and groves of poplar." He relates that "in 1788 a small spot was cleared, and sown with turnips, potatoes, carrots and parsnips; the first grow large andthe others thrived well."

58/118 Nothing reliable known.

58/119 Nothing reliable known.

FROM 100TH TO 120TH MERIDIAN, AND BETWEEN THE 57TH AND 58TH PARALLELS OF LATITUDE.

57/100 Nothing reliable known.

57/101 Nothing reliable known.

57
102 Nothing reliable known.

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103 Nothing reliable known.

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104 Nothing reliable known.

57
105 Nothing reliable known.

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106 Nothing reliable known.

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107 Nothing reliable known.

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108 Nothing reliable known.

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109 Nothing reliable known.

57
110 Nothing reliable known.

57
111 The Athabasca runs through the eastern half of this section.

Macoun Geo. Rep., 1875-76, *pp.* 169-170-171, and 93.

The river banks about 50 feet high. Country for 50 miles below the Forks on both sides of the river is evidently very good; confirmed by botanical observations; dry limestone soil of excellent quality and well suited for agriculture.

"Noted every species of plant. Out of 217 species, 186 were representatives of Ontario flora, showing there was not a single species to indicate a northern latitude. Of the remaining 31 species, all except two belong to the prairie and forest lands along the Saskatchewan. The familiar eastern species were in their usual locations, and nothing but the everlasting spruce and aspen forest reminded the traveller that he was nearly 800 miles north of Ottawa."

"Spruce forest means a damp soil with moss as principal undergrowth; while aspen represents the dry open forest, and whenever the spruce forest is destroyed the other takes its place."

Seventeen miles below the Forks found bituminous shales and tar oozing from the bank of river. "Mr. Moberly states that tar beds extended up the Athabasca to near mouth of Lac la Biche River." We also passed tar springs on Clear Water River, ten miles above Forks.

$\frac{57}{112}$ Nothing reliable known.

$\frac{57}{113}$ Nothing reliable known.

$\frac{57}{114}$ Nothing reliable known.

$\frac{57}{115}$ Nothing reliable known.

$\frac{57}{116}$ Nothing reliable known.

$\frac{57}{117}$ The Peace River passes through the north-western portion of this section.

Sir Alex. Mackenzie.

Left the "Old Establishment" in May, 1793, and proceeded up the Peace River on his journey to the Pacific. He states that at 17 miles above Old Establishment the banks of river are steep and hilly, displaying a face of several strata of reddish earth and brown stone, bitumen and greyish earth, and below water a red stone. He also saw several salt springs.

The whole country was very beautiful with exuberant vegetation and groves of poplar; on the east, a range of hills, several covered with white spruce and soft birch.

At 50 miles further, the forest consisted of spruce, birch and the largest poplar he had ever seen. Beyond this, he describes very little of the character of Peace River country, his journal being taken up more with the incidents of travel along the river and intercourse with the Indians.

$\frac{57}{118}$ The river winds into the south-eastern corner of this section.

Macoun Geol. Rep., 1875-76, *p.* 158.

BATTLE RIVER POST ON THE PEACE RIVER.

The land in this neighbourhood is astonishingly rich and fit to produce anything. From this westward the country is not known.

$\frac{57}{119}$ Nothing reliable known.

FROM THE 100TH TO THE 121ST MERIDIAN, AND BETWEEN THE 56TH AND 57TH PARALLELS OF LATITUDE.

56/100 Nothing reliable known.

56/101 Nothing reliable known.

56/102 Nothing reliable known.

56/103 Nothing reliable known.

56/104 Nothing reliable known.

56/105 Nothing reliable known.

56/106 Nothing reliable known.

56/107 Nothing reliable known.

56/108 *Macoun Geo. Rep.*, 1875-76, *p.* 175.

Passed along Buffalo Lake at south-west corner of this section, and describes the country as peat bog, and marsh.

56/109 *Macoun Geol. Rep.*, 1875-76, *pp.* 94, 173, 175 *and* 177.

Passed through this section diagonally along the general line of travel.

Banksian Pine, indicating a sandy soil appear on the Clear Water River in this section.

The country rises very rapidly after leaving the Athabasca, and the river passes through canyons, forming large rapids, the limestone rock rising vertically to a height of from 60 to 100 feet above the stream, the hills in the neighbourhood becoming 500 feet high. The scenery here is finer than any thing seen since leaving the River Thompson, of British Columbia. The rock of this locality is in appearance like the Niagara limestone, as seen at Owen Sound. Sulphur springs also are found here.

PORTAGE LA LOCHE

"Is the height of land between the McKenzie and Churchill Rivers." The portage is less than 12 miles long; on level plateau above the river the vegetation changes and the surface is either swampy and covered with black spruce or dry and sandy with Banksian pine. This being on the great thoroughfare to the north, horses are generally kept on this portage for the transfer of goods, &c.

METHY LAKE

Is 600 feet above the Clear Water; the country wet and cold; many boulders on surface; land generally unfit for cultivation; potatoes grown, but had been killed by frost this year, 1875, on 9th September (in Manitoba, however, they had been killed 21st August). Barley had been grown the preceding year.

"In the country between Portage La Loche and Buffalo Lake occur peat bogs of good quality, and extensive marshes."

Mr. H. J. Moberly, of the Hudson's Bay Company, who has resided at Fort McMurray, Forks of Athabasca and Clear Water, for many years, furnished Mr. Marcus Smith with a sketch map of the country between the 109th and 115th meridians, and from Lac la Biche north to the Forks of the Athabasca and Clear Water Rivers, which tract he has traversed in several directions.

The information conveyed by this map is rather general and difficult to locate with accuracy, but perhaps it may serve to give some idea of the character of this region. It will accordingly be referred to in some of the following notes.

Moberly's Map

Shows a large swamp, without timber from Methy Lake westward about 20 miles in width.

56

110 *Macoun Geol. Rep.*, 1875-76, *p.* 173.

THE CLEAR WATER RIVER.

Running across the northern portion of this section "is very crooked, with gently sloping banks, which rise to at least 200 feet, and are clothed with aspen on both sides." Ascending the river the balsam fir becomes quite common, and more spruce appears. All the land seen for some distance above the Forks was fit for agriculture; Grindstones are obtained here by the H. B. Co.

Moberly's Map.

The Pembina River is shown to run north-westerly through this section, and to empty into the Clear Water about 15 miles east of the "Forks." Poplars and cypress occur to the west of the Pembina River, a large swamp, without timber, occupying the central portion of section, and on the western side a small lake, cypress, pine, and some small swamps.

56

111 *Macoun Geo. Rep.*, 1875-76, *p.* 171-172.

FORKS OF THE ATHABASCA AND CLEAR WATER RIVERS.

"Mr. Moberly, the officer in charge of Hudson's Bay Post, at this place, states that his wheat and barley were superb, and that the country round the Forks was well suited for farming purposes. About a mile above the Forks on the Clear Water, is a beautiful prairie on which great quantities of hay were cut with a reaper. The Hudson's Bay Company could raise enough wheat here to supply the demands of all their Posts in the North. The frost occurred on the 9th September. Mr. Moberly mentioned a spring 15 miles south of the Forks, on the Athabasca, with very strong brine, and also another the same distance below the Forks.

The Hudson's Bay Company are now (1876) building a steamboat at the Forks to navigate Athabasca River and Lake and the Peace River as far as the Chute, and Slave River to the portages. Another steamer below the portages on Slave River would give uninterupted navigation to the Arctic Sea, while another on Peace River above the Chutes could run to Hudson's Hope, thus forming navigation of over 2,000 miles.

Moberly's Map

Shows swamp, without timber about 12 miles in diameter, south-east of the Forks, and, on trail running south from Hudson Bay Post at the Forks, 20 miles of poplar and cypress, with a few swamps and creeks; a large swamp without timber about five miles south of the Athabasca, and extending for 15 miles southerly to an extensive area of Rocky hills, enclosing swamps, which occupies the southern portion of section. The sides of these hills are thickly wooded with pine and poplar.

56

112 *Moberly's Map.*

In the northern part of this section, a large swamp without wood is shown a few miles north of the Athabasca. Old Fort River passes through the southern part, flowing westerly into the Athabasca; and, on the west side of the river, a belt of dry land in the south-west angle of section.

56

113 *Moberly's Map.*

In the north-east part of section, "Timber Mountain" is shown, and in the southern portion "High Ridges or the Buffalo Mountains."

56

114 Nothing reliable known.

56

115 Nothing reliable known.

56

116 Nothing reliable known.

56
117

Messrs. Horetzky and Macoun entered this section at the south-east corner, and travelled north-westerly, striking the Peace River a few miles below the mouth of Smoky River.

Horetzky Pac. Ry. Rep., 1874, *p.* 46.

"PEACE RIVER was reached after traversing 75 miles (by account) of a very fine country, generally easy and level and of excellent soil, in great part timbered with poplar, spruce and some tamarac."

Valley of Peace River at least two miles wide and some 750 feet deep.

Marcoun—Pac. Ry. Rep., 1874, *pp.* 70, 82.

Between Lesser Slave Lake and Peace River, at mouths of Heart and Smoky Rivers:—

"Distance about 70 miles, through a level country gently rolling in parts, but without a hill. For last thirty miles most lovely country, being part prairie and part aspen forest." "Level country on this portage *is said* to extend across Smoky River to Rocky Mountains, 180 miles." Vegetation similar to that round Edmonton.

Selwyn. Geol. Rep., 1875-76, *p.* 56 to 60.

HUDSON BAY POST, on left bank of river, two miles above mouth of Smoky River.

"The bank of Peace River is here 40 feet high, of coarse rounded gravel and sand. From top of bank a well-grassed level plane extends for 250 yards, to base of rounded grassy hills, which rise steeply to 500 or 600 feet above river, and then stretch away in a vast rolling prairie dotted with groves of spruce and poplar."

"Looking across Peace River to the south and south-east, general outline and elevation of the country does not differ from that on the north side, but in place of open, grassy hills and lightly wooded dells, an uniformly and apparently pretty thickly wooded country extends on all sides as far as the eye can reach."

"Main channel of river at the Fork is 400 to 500 yards wide."

"Sixteenth and seventeenth August were the hottest days experienced; thermometer reached 92° and 94° in the shade."

SMOKY RIVER.

At 25 miles up the river, he ascended to the plateau 600 feet above the river; and saw "15 or 20 miles up the river valley; general course S. 25° E., to where the valley appeared to branch, and on all sides there was a perfectly level horizon of forest country."

"Smoky River is not as wide at low water as Pine River." "The valley from one plateau to the other is nearly two miles."

REPORTED TRAIL FROM PEACE RIVER TO JASPER HOUSE.

"On our way down the Peace River we met a party of Crees and Half-breeds from Edmonton and Jasper House, who had come to hunt and pick berries. They informed me there was a good horse-trail all the way to Jasper House, which can be reached in about ten days. Except at the crossings, the country is stated to be level throughout and lightly timbered."

Returning to Dunvegan, by trail inland, found the country mostly level and all fine prairie land, the width from Peace River to foot of hills being from a quarter, to three quarters of a mile.

$\frac{56}{118}$ *Horetzky Pac. Ry Rep.*, 1874, *p.* 47.

From opposite mouths of Heart and Smoky Rivers, by trail on north side of Peace River to Dunvegan.—

50 to 60 miles over level country, generally prairie, which extends to the north for some distance, but cut up by the deep beds of numerous streams. " On the south side from Smoky River upwards to opposite Dunvegan the country has much the same appearance, but from this point it gradually becomes more thickly timbered and rougher and maintains this character to the Rocky Mountains portage."

Only a small portion of this section borders on Peace River, and little is positively known respecting the greater part of it.

$\frac{56}{119}$ *Horetzky Pac. Ry Rep.*, 1874, *p.* 47.

FORT DUNVEGAN.

" Is situated on the north side of Peace River upon a level terrace 30 feet above mean river level. The height of country behind and round Dunvegan is about 700 feet over the river, which here has an altitude of about 900 feet above the sea." " From the Rocky Mountain portage down to Smoky River (a distance of, say, 250 miles) the Peace River flows through a depression in the country ranging in depth from 800 to 600 feet. The underlying formation is limestone, and the whole of this region appears to be composed of an immense layer of clay and alluvial soil, resting upon a horizontal bed of that material. Sandstone is also found in large quantities, and grindstones of excellent grit are to be found in the river bed."

" The climate of this region and of the Peace River Valley generally, is somewhat similar to that of Red River, but the extremes of heat and cold are not so great, and the climate is dry and salubrious and is tempered by the westerly winds which here prevail and are mild; snow rarely reaches and seldom exceeds two feet, and does not pack."

See also Horetzky's remarks in previous section $\frac{56}{118}$.

Nothing definite is known respecting the northern half of this section.

$\frac{56}{120}$ *Macoun Geol. Rep.* 1875-76, *pp.* 154, 155.

ST. JOHN, 26th July.—" Much warmer than Hudson Hope. Soil richer and vegetation far more advanced." " Oats stood fully five feet high, and barley of nearly equal growth;" wild grass, three feet.

Region north of River. " We found level of country, 700 feet above bottom of valley." Plateau either dead level or slopes away from river. Travelled nine miles north and found whole country covered with luxuriant vegetation. Soil must be exceedingly rich to support such growth year after year; and [illegible] summer temperatures high, for vegetation to be so far advanced at this period.

All the cultivated land at St. John is immediately above spring flood level. There is no reason why cereals should fail on plateau above, as soil is, if anything, better; the ripening would, however, be one week later, as also the same difference in disappearance of snow.

Potatoes were dug at St. John in quantity, large and dry, on 2nd August. Barley and oats ripe about 12th August.

" The flora of this region is almost identical with that of Ontario."

These remarks apply to the southern end of this section.

56/121 *Selwyn's Geol. Rep.*, 1875-76, *pp.* 45 to 56.

Hudson Hope to St. John by River 38 Miles,

The general character of valley is uniform; on south side hills are thickly wooded; on north side alternately patches of prairie and coppice of aspen and poplar; they rise abrubtly in broken slopes and steps 600 to 800 feet above the river. On 9th August, barley was ripe, with large grain and full, vegetables also in advanced state.

Little Lake,

One of the sources of Pine River North, seven miles to the north-west of St. John.

"After rising 724 feet above river we came upon a fine level of slightly undulating country, covered with richest herbage of astonishing luxuriance. I have seen nothing in the Saskatchewan region that at all equals it. The soil and climate are here better, the former a rich loam, resting on gravel and sand, underlaid the dark shales of the cretaceous formation, a similar country extends for many miles both up and down the river."

Macoun Geol. Rep., 1875-76, *p.* 152.

Peace River at Hudson Hope

In valley 700 feet below plateau, has from this a general easterly course for 200 miles. Slopes of right bank clothed with thick forest of tall spruce, ascending gives place to aspen forests, which either covers the country or passes insensibly into prairie. Left bank destitute of trees except in hollows, always aspen.

"On 22nd July, 1875, vegetation very rank, although little rain of this season, and had been all spring. Wild peas and vetches grow to amazing height; vetches, roses, willows, herbs and grasses of genera, Poa, Triticum and Bromus, have almost tropical luxuriance. Potatoes, onions, turnips, carrots, cabbage, and other vegetables grow in the gardens, and at this date potatoes planted 28th April were of very fair size and fit for use."

"Growth extremely rapid, owing partly to length of day, cloudless sky and heavy dews, also, possibly, in part to great range of temperature during the 24 hours, from about 45° at sunrise to 80° Fahr., at noon." Was informed that "in 1874 that there was no frost from 1st May until 15th September. In 1875, sowing commenced in last week of April, and first frost came on 8th September."

FROM THE 100TH TO THE 123RD MERIDIAN, AND BETWEEN THE 55TH AND 56TH PARALLELS OF LATITUDE.

55/100 Nothing reliable known.

55/101 Nothing reliable known.

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102 *Richardson Arctic Search, Expn., vol. I., pp.* 81–84.

The canoe route passes through the south-west corner of this section. The country is composed of granite rocks, "and the river has the character peculiar to the district, that is, it is formed of branching lake-like expansions, connected by falls or rapids."

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103 *Richardson Arctic Search, Expn., vol. I., pp.* 90–94.

The route passes through Woody Lake to Frog Portage, crossing which the Missinipi or Churchill River is reached. "No change of formation takes place in passing from the Saskatchewan River system to that of the Missinipi."

"Frog Portage is the most northerly point of the Saskatchewan Basin, and lies in 55° 26′ N. latitude, 103° 20′ W. longitude."

The primitive formation continues along the Churchill. "The country in this neighbourhood is hilly, and a few miles back from the river the summits appear to rise 400 or 500 feet above its surface. The resemblance of the whole district to that of Winnipeg River is perfect, and the general aspect of the country is much like that of the north shore of Lake Superior, though the water basin is not so deeply indented."

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104 *Richardson Arctic Search Exp., vol. I., p.* 95.

The Churchill flows south-easterly through this section, expanding into several small lakes—through the same primitive formation.

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105 River and rock formation similar to that previously described in $\frac{55}{104}$.

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106 *Richardson Arctic Search Exp., vol. I., p.p.* 98–99.

The aspect of the country changes on entering the lakes of the Churchill in this section. "The rising grounds have a more even outline, and one long low range rises over another, as the country recedes from the borders of the water, where it is generally low and swampy. The trees near the water are almost exclusively birch and balsam-poplar or aspen; the spruce-firs occupying the distant elevations." "The prevailing rock is a brownish-red, fine-grained sienite, resembling a sandstone."

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107 *Richardson Arctic Search Exp., vol. I., pp.* 100–103.

Primeau's Lake, on the Churchill, is situated in the north-east corner of this section. "The channel between the eastern and western portions of the lake winds among extensive sandy flats, covered with 'bents,' and in some places there was a rich crop of grass." The rock here is the same brownish red, slaty sienite. Lac Isle à la Crosse lies on the western side of this section. "On its shores there are fragments of a white quartzose sandstone, but I noticed no limestone. The country consists of gravelly plains, having a coarse sandy soil and numerous imbedded boulder stones."

"**Beaver River**, the principal feeder of the lake, flows from Green Lake, near the valley of the Saskatchewan, in the 54th parallel of latitude.

"The winter path from Isle à la Crosse to Carlton House, ascends this river to its great bend, whence it leads to the Saskatchewan plains, through an undulating country, but without any marked acclivity. I consider it probable, therefore, that Isle à la Crosse Lake and Carlton House do not differ from each other in their height above the sea by more than two hundred feet.

"On Beaver River the strata are of limestone, and a line drawn from the north side of Lake Winnipeg to the south side of Isle à la Crosse Lake, runs about north 58° west and touches upon the northern edge of the limestone in Beaver Lake; that line may, therefore, be considered as representing the general direction of the junction of the limestone with the primitive rocks in this district of the country."

Macoun Geol. Rep. 1875–76, *pp.* 176–177.

Entered this section by Lac la Crosse, and passed south through the central part, ascending the Beaver River.

ISLE LA CROSSE LAKE.

Deep River and Isle la Crosse Lake are both surrounded with aspen forests, (which in north always indicates good soil, but spruce forest means damp soil' with moss as principal undergrowth; where spruce is destroyed, aspen takes its place.) The soil at the Fort is poor, compared to the Peace River; principally a loam mixed with a good deal of white sand. Further from lake the soil improves, being mostly clay loam. Apparently, much greater rain fall than on Peace River, and possibly less heat and crops may be later in coming to maturity. On 22nd September, potatoes were still quite green; all kinds of vegetables grow well, and are of large size. Wheat, barley and oats succeed but former is not considered a sure crop. Fall wheat ought to grow here as snow lies on ground until melted by the hot suns of April.

BEAVER RIVER.

Along the first few miles; young poplar, a few Banksian pine, and groves of spruce, and after passing rapids the country is sandy and unfit for cultivation

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108 *Macoun Geol. Rep.* 1875–76, *p.* 176.

Entered this section from the north, passing across the north-east corner by Clearwater Lake and Deep River to Lac la Crosse.

The country here changes for the better, and the forest around Clearwater Lake becomes nearly all aspen.

"The Chipewyan Indians here raised potatoes. They are the only Indians east of the Mountains who built houses and have fixed abodes. It would not be difficult to induce them to settle on land."

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109 *Moberly's Map.*

Shows a lake in the north-east portion. The Pembina River flowing through the northern part, on the west side of section, with cypress and poplar to east of river A large swamp is shown on the south-east, and extending easterly.

$\frac{55}{110}$ *Moberly's Map.*

Shows an extensive swamp in northern part and Rocky Hills, extending into the north-west; between this swamp and the Hills, Mr. Moberly travelled through 20 miles of cypress and pines, interspersed with small swamps. The Pembina River is shown to flow easterly through the centre, having prairies with poplar and cypress trees on either side. The "Old Horse Track," from Lac la Biche to Portage la Loche, crosses the Pembina here, passing through 28 miles of prairie and poplar.

In the south-eastern part Jack-fish Lake is shown, a trail passing to west of it through cypress and pine for 20 miles. The Thickwood Mountains occupying the southern part of section.

$\frac{55}{111}$ *Moberly's Map.*

Rocky Hills are shown to stretch across the north-east angle, and Marten Mountain to occupy the south-western half of section; in the valley between these ranges of hills is situated the water-shed of the Old Fort and Pembina Rivers, the former flowing westerly, and the latter south-easterly. The top of Marten Mountain is mostly swamp. The sides of these hills are thickly covered with pine and poplar.

$\frac{55}{112}$ *Moberly's Map.*

Marten Mountain covers nearly the whole of the eastern half of this section, and large swamps without wood lie on its western base, extending to the Athabasca. The southern portion is also swampy.

$\frac{55}{113}$ *Moberly's Map.*

A few miles to the west of the Athabasca, large swamps are shown to stretch for 30 or 40 miles north and south. And the Buffalo Mountains extend over the N.-W. portion of section, with swamps again to the south.

$\frac{55}{114}$ Messrs. Horetzy and Macoun passed across the south-west corner of this section to the Lesser Slave Lake.

Horetzky Pac. Ry. Rep. 1874, *p.* 46.

Between Athabasca and Little Slave Lakes—"an entirely wooded, swampy and in places, very hilly country, utterly useless for agricultural purposes, and for a line of road excessively rough." On approaching the lake there is an improvement in the soil.

Macoun Pac. Ry. Rep. 1874, *p.* 69.

Between Deer Mountain and Lesser Slave Lake, "the descent to the north-west is very rapid, being over 1000 feet in ten miles, and thence to the lake the ground falls rapidly; mountains are seen to the south-west. The whole valley seems covered with a forest of pine and spruce, interspersed with poplar. This stretch is a dreary country."

Found coal like that of Edmonton, in the ledges of this mountain.

$\frac{55}{115}$ The above named gentlemen passed along the southern shore of Lesser Slave Lake.

Horetzky Pac. Ry. Rep. 1874, *p.* 46.

LESSER SLAVE LAKE.

"Soil in vicinity of Lesser Slave Lake of very good quality, vegetables of various kinds are raised and there is luxuriant pasturage along the southern and western margin for many miles, but land is wet."

"From this post to Lac la Biche, by north side of Lesser Slave Lake (distance in air line, say 175 miles), the country is by all accounts thickly wooded and not hilly, although some swamps exist."

Macoun Pac. Ry. Rep. 1874, *pp.* 70, 81.

"Lesser Slave Lake about 75 miles long and six miles wide.

"The south shore is low and flat, and extensive marshy meadows extend round the south-western end, covered with most astonishing growth of grass, chiefly blue-joint, higher than a man's head.

"Many plants common to Western Canada, none indicate an artic or subartic character. Soil alluvial.

"The north shore is bolder, presenting fine appearance, a number of apparently bare hills rising from margin of lake, as seen from the Post, but were found to be covered with prairie plants; this is accounted for by their southern aspect."

"Coal was found along the banks of Swan River, a tributary of Little Slave Lake."

$\frac{55}{116}$ Messrs. Horetzky and Macoun passed through this section north-westerly from the west end of the above lake to north-west angle, striking the Heart River.

See sec. $\frac{56}{117}$, for Messrs. Horetzky and Macoun remarks.

$\frac{55}{117}$ See sec. $\frac{56}{117}$ for Mr. Selwyn's description of Smoky River.

$\frac{55}{118}$ The PEACE RIVER passes through the northern part of this section. None of the travellers referred to have been south of the river in this part, but their remarks on the adjoining sections will, probably to some extent apply to this one.

$\frac{55}{119}$ Mr. Horetzky passed through the northern portion of this section.

Horetzky Pac. Ry. Rep. 1874, *p.* 48.

Macoun Pac. Ry. Rep. 1874, *pp.* 72, 83, 84.

"Between Dunvegan and St. John, by trail on south side of river, about 120 miles by land. Trail passes in some places 20 miles from river."

Many miles of beautiful farming country, alternating with spruce, aspen and cypress. "The plants observed here grow around Edmonton, and where-ever wheat will come to perfection."

Some of the country along this route is very fine, partly timbered, and in some places dense. Soil excellent, and vegetation vigorous.

In bank of stream, 16 miles from Dunvegan, a thin layer of coal or bituminous shale was found.

$\frac{55}{120}$ The northern part traversed on trail from Dunvegan to St. John.

See Messrs. Horetzky and Macoun's remarks in previous sec. $\frac{55}{119}$.

Hunter Pac. Ry. Rep. 1878, *p.* 79.

Mr. Hunter terminated his exploration from west in 1877 in this section—entering it for a few miles about lat. 55° 30'.

Eastward from forks of Pine River up the east branch, and thence eastward—Camp 61, at foot of pretty high ridge; camp 2,300 feet above sea, and distant easterly from lower forks of Pine River 30 miles. "From the time we left the east branch we had evidently been travelling along the southern limit of the plateau, for near at hand on our right rose hills and ridges 700 to 1,000 feet above the general level, while the country to the north looked comparatively even. In the vicinity of Buffalo Creek the land is good and the pasturage very rich."

From this point Mr. Hunter retraced his steps to British Columbia.

$\frac{55}{121}$ *Selwyn Geol. Rep.* 1875-76, *pp.* 52, 53, 54.

Mr. Selwyn travelled up the Pine River as far as Table Mountain, about the centre of the section.

PINE RIVER

Valley, between table lands on either side from 1 to 1½ miles wide patches of open prarie, but generally both banks are thickly wooded.

FORKS OF PINE RIVER.

" Upper terrace 400 feet above river. No high mountains visible."

" We camped on west branch, 3½ miles above the forks; the river here narrows. Half a mile above the camp found four seams of good bright coal of 6, 8, 24 and 6 inches thick respectively. Following day ascended Table Mountain four to five miles distant. Alt. of camp 1,382 feet; height 228 feet above St. John."

TABLE MOUNTAIN,

3,400 feet above sea. "View from it was magnificent. To the right the Peaks at the gorge of Peace River easily recognized."

Selwyn Geol. Rep. 1875-76, *pp.* 61-64.

Mr. Selwyn also visited Moberly's Lake, situated in the northern part of this section.—15 miles distant from Hudson's Hope.

Trail ascends by several steps to Plateau; an undulating country of sandy or gravelly ridges, covered with small pine, and swampy depressions, with spruce and tamarac and well-grassed flats, thickly wooded with aspen, alder and willow.

Ascended hill at south-west corner of lake, " 2,000 feet above Hudson's Hope and only little less elevated than Table Mountain on Pine River."

" The hills around lake are richly grassed, Pea vine, Astralagus and various, nutritious grasses standing above one's knees on horse-back.

"There are large areas of open prairie land, and more which are wooded with willow, aspen and poplar coppices. On the higher slopes pine prevails, and in low grounds spruce, tamarac and poplar."

"Charlette (guide) tells me that the snow fall is here comparatively light, and that horses do well through the winter on these hills.

"I consider this a region far more fitted for settlement than much of the Saskatchewan country.

"We are now in the middle of September, and the thermometer has only once reached 32°, and potatoe tops at Hudson's Hope are still green.

"As a contrast to this it will be seen, in my report on Saskatchewan country in 1873, that in region about Edmonton and Victoria, 2° further south, and about same elevation, the thermometer fell on 4th September to 28°, on 6th to 24°, on 11th to 20°, and again on 23rd to 20°."

Mr. Hunter explored through centre of this from west to east. See sections $\frac{55}{120}$ to $\frac{55}{122}$. He also ascended Table Mountain.

Hunter Pac. Ry. Rep., 1878, *pp.* 79-80.

"In passing on return I ascended Table Mountain, from the top of which an extesive view was obtained as follows:

"S. round to S. 80° E. many low hills rising from the plateau 500 to 1,500 feet. S. 80° E. to N. 60° E. hills gradually flatten. N. 60° E. to N. 15° W., a comparatively level country.

"N. 75° W. very high peaks, distant 40 to 50 miles (these are no doubt the southern peaks of the high range in the great bend of the Peace River).

"N. 15° W. to S. 70° W. a flat country for 30 or 40 miles, beyond which rise high, rough mountains well patched with snow.

"S. 25° W. up the valley of the middle branch towards the source of the Misinchinca, high snowy mountains. All the country to the south rough and irregular.

"Height of Table Mountain 3,500 feet above sea."

$\frac{55}{122}$ *Hunter Pac. Ry. Rep.*, 1878, *pp.* 78-79.

Explored eastward along the Pine River about the centre of this section

"On 18th August, about two miles from camp 44, and 22 miles from the summit, an open alluvial flat was reached on the left bank of the Pine River, and a change in the character of the valley became apparent. Up to this point, which is probably the extreme western limit of the "fertile belt" no land suitable for settlement or cultivation was seen east of the mountains."

"From Camp 44 to the Canyon, a distance of 43 miles, Pine River Valley is from 1 to 2 miles wide. A very large proportion of the low land in this distance is fit for settlement, and the pasturage in the valley and on the north hill slopes is of the richest description. Grass and pea-vine in profuse luxuriance, with clumps of poplar and pine, cover thousands of acres, rendering this part of the country peculiarly attractive.

"From the Canyon to the Lower Forks the cultivable land is less extensive, but the pasture is equally abundant and rich. The country abounds in large game such as bear, cariboo and moose.

"Hill slopes in many places distinctly marked by the unbroken terraces, rising in some instances 1,000 feet above level of river."

The Rocky Mountains cross the western portion of this section.

FROM THE 100TH TO THE 120TH MERIDIAN, AND BETWEEN THE 54TH AND 55TH PARALLELS OF LATITUDE.

$\frac{54}{100}$ *Sir John Richardson*, 1848, *Arctic Searching Expedition p.* 67.

"The granite and gneiss rocks which form the east shore of Lake Winnipeg strike off at its north-east corner, and passing to the north of Moose Lake go on to Beaver Lake, where the canoe route again touches them. At some distance to the westward of them the Saskatchewan flows through a flat limestone country, which is full of lakes."

$\frac{54}{101}$ *Sir John Richardson*, 1848, *Arctic Searching Expedition p.* 77.

Sturgeon River touches on the western part of this section. "Entire bed of river consists of limestone sometimes lying in nearly horizontal layers, more or less fissured. In lower part of river the banks are sandy, a considerable deposit of dry light soil overlies the limestone, and vegetation is vigorous."

$\frac{54}{102}$ *Sir John Richardson*, 1848, *Arctic Searching Expedition, p.* 79-82.

Pine Island Lake, a dilitation of the Saskatchewan, lies in the southern part of this section. Here "the limestone (silurian) rises in successive outcrops to the height of 30 feet above the water, the strike of the beds being about south-west by west, and north-east by east, or at right angles to the general direction of the gneiss and granite formation, which lies to the eastward."

"At the outlet of Beaver Lake, (in eastern portion of this section) and at several succeeding points on both sides of the canoe route, the thin slaty limestone forms cliffs 30 to 40 feet high; but about the middle of the lake there is a small island of greenstone. Beyond this we again touched upon the granite rocks, which we had left at the north-east corner of Lake Winnipeg, bearing from this place about east 82° south."

The Missinipi or Churchill River did not open this year (1848) until 6th June, but it seldom continues frozen beyond the 1st of June.

At Ridge Portage the rock is gneiss, resembling mica slate. Ridge Rapid, lat. 54½°, "is said to be the highest point to which sturgeon ascend in this river; and it is most probably the northern limit of the range of that fish on the east side of the Rocky Mountains."

A tenacious clayey soil is formed by the action of the weather on the slate. And "the inequalities of the country here, as well as its vegetation, are very similar to that on the Kaministiquia, where the same formation exists."

The woods consist of birch, pine, aspen, larch and balsam-poplar."

$\frac{54}{103}$ Nothing reliable known.

$\frac{54}{104}$ Nothing reliable known.

$\frac{54}{105}$ Nothing reliable known.

$\frac{54}{106}$ Nothing reliable known.

$\frac{54}{107}$ *Macoun Geol. Rep.* 1875-76, *pp.* 180, 181.

Mr. Macoun passed through the central portion of this section, from north to south, *vid* the Beaver River, and Green Lake, and thence by land towards Carlton.

He describes the country adjacent to Beaver River here as well suited for settlement. The banks of the river were clothed with willow, alder, dogwood and poplar; the soil of excellent quality, and covered with vetches in open places. Proceeding south he further describes the banks all alluvium 10 feet high, and the land on both sides very rich.

Green Lake.—This region is fit for settlement throughout, the soil being first class and quite dry; found excellent potatoes, barley also succeeds well, but wheat is as yet doubtful. Frost on the 8th September killed all the potatoes, showing it is colder than further north. There are myriads of whitefish in river and lake.

On the trail from Green Lake to Carlton, 140 miles; the first day, passed through fine tract of country, rather wet in places but having good soil; this part is evidently a water-shed.

$\frac{54}{108}$ Nothing reliable known.

$\frac{54}{109}$ *Moberly's Map.*

Shows a large swamp occupying the N.-E. portion of this section and south of it two lakes known as Goose and Cold Lakes, on the south side of the latter there is an Indian village, from which extends a cart track to Carlton.

$\frac{54}{110}$ *Mr. Marcus Smith, Deputy Engineer in Chief, C. P. R.*

During his journey of 1877, entered this section on its southern side, crossing it north-westerly towards Lac la Biche.

The following is obtained from his journal:—

In neighbourhood of Middle Creek (202 miles, reckoned from Carlton,)—The country to the south, west, and north is all forest of poplar, black pine and spruce. Soil poor, but plenty of pea-vine among the brush, the surface lumpy and broken.

Moose Hill Creek, 20 feet wide, in deep valley. 1½ mile beyond this, trail branches off to Lac La Biche, on a splendid road over sandy country for 8 miles.

The general trail, from Fort Pitt to Edmonton, enters this section on the south, at Middle Creek, traversing the southern portion a few miles to the north of the Saskatchewan.

Selwyn Geo. Rep., 1873-74, *p.* 36.

Observed in this part "Two species of pine and spruce trees at intervals along route, small poplar thickets everywhere, with numerous swampy creeks, pools and lakes between ridges and hills of sand and gravel, occasionally large boulders on the surface, nearly all of gneiss and granite.

Moberly's Map.

The Thickwood Mountains cross the north-east part of this section and the trail passes here for 25 miles through pines, cypress and fallen timber.

54
III *Sandford Fleming, C.M.G. Engineer-in-Chief, Canadian Pacific Railway Report,* 1874, *p.* 38.

Notes on the character of the country traversed across the continent in 1872 by Mr. Fleming.

"As we came within 100 miles of Edmonton, the country became more hilly, and the hill sides were covered with heavy wood. The flora continued the same as on the eastern prairies, but it was here somewhat more luxuriant; a good deal of low birch and scrub pine, *pinus Banksiana,* is met in this locality."

Marcus Smith, 1877.

Entered this section on the east, about latitude 54° 20', and continued north-westerly. He first passed through thick poplar bush for seven miles, small lakes to right and hills 200 to 300 feet high to the north about six miles distant. Thence passed dry sloughs; and at 224½ miles a small lake half a mile to the north; then entered on a level plateau, clothed with a luxuriant growth of grass and vetches, with occasional clumps of poplar and spruce, but a scarcity of water.

At 234 miles the grass and vetches reached the saddle girths of horses. A rich, grassy plain extended for four miles further, and then, crossing a valley 200 feet wide by 20 feet deep, entered poplar bush for two miles, and emerged at foot of hill, ascending which, reached its summit at altitude 1680 feet, and passing some lakes, came upon a beautiful park-like country covered with richest grass, pea-vine and vetches, with occasional clumps of poplar and spruce; at 247 miles another small lake, and clumps of trees consisting of poplar, spruce, Banksian Pine, and Tamarac.

BEAVER RIVER.—At 256 miles, crossed below junction of the two streams, 90 feet wide, and now two feet deep, subject to rapid rises. The banks were twelve feet high, and the meadows along them produced the most luxuriant grass of various descriptions, with vetches three to four feet high. The adjoining country rose to 60 feet above river. After crossing high ridge entered a narrow valley covered with Banksian pine, and passed along good road through fine grass, among clumps of poplars, to Gull Lake (263 miles). Thence passing on flats south of lake for five miles to ridge, from which he obtained a most extensive view of the surrounding country. To the east and south-east no hill could be seen; to the west the country was rolling but no hills; a little to north of east appeared range of hills, estimated 30 to 40 miles distant. Thence travelling north of west crossed valley with chain of ponds, and through thick poplar bush, entered country rich in grass and vetches. The waters from Breech Clout Lake (287 miles) flow to the north-east; thence continued through beautiful meadows to belt of poplars (291½ miles) country here falls rapidly. At 297 miles crossed Beavers Creek, 30 feet wide and rapid. Thence most of the way passed through thick poplar wood to H. B. Post.

From Lac la Biche Mr. Smith travelled to the Saskatchewan at Victoria.

The first 31 miles is over rather rough country to Beaver River, here 100 feet wide, and deep, country continuing rough to Snake Hills, and thence over good road, cut through the bush for 39 miles to Fish Lake; here there were several houses; thence by excellent road through woods for 5 miles to a beautiful rich valley, where Indians were making hay. At Good Fish Lake lives Mr. Joseph Howse, who furnished us with good milk and vegetables.

Thence across wet marshy meadow to a wooded hill, and, passing for two miles over elevated plateau, reached an extensive marsh at 60 miles. The country from the woods south of Good Fish Lake to this point is moor like, with numerous marshes and occasional belts of poplar; afterwards it becomes rolling, with some deep valleys. After crossing White Mud River, 40 feet wide, running easterly, we ascended a high plateau covered with scrub pine, which continued for 4 miles to open ground and good grass (96 miles).

Two miles further crossed Smoking Lake River, 15 feet wide, running S.W., and thence through fine open valley; and at 99½ miles, came to Indian encampment (over 100 lodges) waiting for their subsidy under the treaty. Thence passing over hill to the left we reached Victoria.

Selwyn Geol. Rep., 1873-74, *p.* 36.

Passing along trail mentioned in previous section through southern portion of the

DOGRUMP CREEK TO VICTORIA.

Thence 16 miles to Egg Lake, Snake Hills bearing W. 40° S., and thence nine miles to Saddle Lake, but little change in character of country. Wood is less plentiful, only scattered poplar and willow coppice, a few spruce, pine and larch. Rich black soil, a few boulders of gneiss and granite, good pasturage everywhere, two species of vetches or pea-vines being very abundant and luxuriant.

Thence 40 miles to Victoria; country sandy, in places thick forest of small pine and spruce.

LAC LA BICHE

$\frac{54}{112}$ Is situated in the north-east corner of this section.

Marcus Smith, 1877.

Lac la Biche, 304 miles from Carlton. Mr. Trail, H. B. Officer at this post, stated that there were about 40 families settled on this lake, principally half-breeds and French-Canadians.

The Catholic Mission is on lake shore about 9 miles N.W. of Post; here met Bishop Ferraud, from whom much valuable information was obtained concerning the country to the north and west.

Barley and wheat thrive well here, as also vegetables. There is a grist mill near the Mission. Abundance of whitefish in this and neighbouring lakes. The timber of the country is Spruce, Tamarac and Poplar, all of good size. The divide between Beaver River and the Athabasca water-shed is not more than 3 miles from Lac la Biche.

Selwyn Geol. Rep. 1873-74 *p.* 37.

Victoria, H. B. Post and Wesleyan Mission (situated near southern boundary of this section) is 813 miles from Fort Garry and 1,900 feet above sea. Soil at Victoria rather light, sandy black loam. Wheat and barley sown in May, and very fine, the latter now being harvested; all garden vegetables grow luxuriantly, but sharp frost had cut potatoe vines; wheat, however, did not suffer.

VICTORIA TO VERMILION, OR WHITE EARTH CREEK.

30 miles—Boggy, water holes, sandy hills and thick woods. In low ground poplar and birch, on ridges spruce and pine.

Surveyor-General, Dominion Lands, Report, 1878—*W. F. King, D.L.S., p.* 18.

VICTORIA.—"There is merely a small settlement here on a flat point on the north side of the River Valley, and comparatively little land is cultivated. The soil is lighter than that of Edmonton, but gives good crops." It is heavier further back from the river. A strip of good land of many miles in width extends along the trail north of the Saskatchewan.

54/113 The Hudson's Bay Company have constructed a waggon road from Edmonton passing to the north through this section, but we have no reliable information concerning the country through which it passes.

54/114 Messrs. Horetzky and Macoun travelled through this Section from south north.

Horetzky Pac. Ry. Rep. 1874, *p.* 46.

EDMONTON TO FORT ASSINEBOINE.

"91 miles of very fair country, of an easy character, and land partly of prairie and timber, latter abundant from Lac La Nonne to the Athabasca." This would seem to refer to the southern half of this section. The traveller then crossed *viâ* the Deer Mountains towards Lesser Slave Lake, and describes his journey as through "an entirely wooded, swampy and, in many places, very hilly country, utterly useless for agricultural purposes."

Macoun Pac. Ry. Rep. 1874, *p.* 69-80.

FROM LAC LA NONNE TO PEMBINA RIVER.

Country more broken and hills steeper, more heavily wooded and soil poorer. From Pembina River land is comparatively level up to the ridges which border the Athabasca. The timber is principally spruce, balsam and aspen; also Banksian pine, birch and willow, with tamarac in few places. Timber generally large; on burnt land wild peas and vetches.

Many plants common to Ontario and Quebec were first seen here, since leaving the Lake of the Woods.

"The Athabasca is large, being wider and deeper than the Saskatchewan, and flows through a pretty wide valley, general elevation of country above river is 300 feet."

FROM THE ATHABASCA TO DEER MOUNTAINS.

For some distance after passing the Athabasca, the country is a series of sand hills, ridges and swamps; then less broken, but half swamp; up to Deer Mountain, which is by aneroid about 3,500 feet above the sea, the country becomes more Arctic in appearance, and near the mountain top vegetation showed high altitude.

Coal like that of Edmonton was found in blocks in bed of Pembina River.

Palliser Exp., p. 123.

Dr. Hector's winter journey, 1859, Edmonton to Fort Assiniboine on the Athabasca.—

"Crossed the Pembina River, which is about 80 yards wide, has a large valley and some fine patches of open land along its banks. The timber is much finer all over the country we are passing through than any in the neighbourhood of Edmonton. The Pembina is the most southerly stream of the Prairies that flows to the Arctic Ocean."

"The Athabasca is a river 300 yards wide, rather larger than the Saskatchewan at Edmonton, with a much wider and deeper valley." The banks rise to a height of 180 feet, and beyond the country seems to be level, but very heavily timbered. Along this portion of the river there is, however, much fine and partially open land, reminding me of the district around Fort Carlton, to the south of this place are many birch trees of good size, and sometimes on the rising grounds the forest is wholly composed of this tree, which is the only hard wood the country produces, and therefore of great value.

$\frac{54}{115}$ *Palliser's Exp., pp.* 123-124.

Dr. Hector's journey up the Athabasca from Fort Assineboine :—

Passed several high cliffs of sandstone to west of the fort; higher up the river found "coal in a sandstone cliff 110 feet high; it occurred as a wedge—shaped mass three to five feet thick, running for several hundred yards." Balsam, poplar, pine, birch and silver spruce grow along the banks. "Passing McLeod's River, a large tributary from the south-west 100 yards wide, the river banks are still densely wooded and are now becoming high and rocky, formed of ledges of sandstone with a sprinkling of cypress pine;" banks appear to be 300 feet high.

$\frac{54}{116}$ *Palliser, p.* 124.

The Athabasca strikes across this section to the south west angle.

"The valley of the river has widened considerably, as if we had passed through the sandstone country, and the timber is again very fine, some of the birch trees being of good size." "Passed Baptiste's river, a tributary of the west, which is 90 yards wide"

$\frac{54}{117}$ Nothing reliable known.

$\frac{54}{118}$ *E. W. Jarvis, Pac. Ry. Rep.*, 1877, *p.* 146.

Mr. Jarvis passed over the south-west corner of this section and describes it as a terribly broken country, crossing high parallel ridges and the intervening valleys, in all of which the water runs north-east, or in a similar course to the Smoky River and the Athabasca.

Nothing reliable known of the eastern or western parts of this section.

$\frac{54}{119}$ Nothing reliable known.

53/100 *Hind's A. & S. Exp., Vol.* 1, *pp.* 454-459.

Mr. John Fleming's journey down the Saskatchewan from Fort à la Corne, 18th August, 1858.—"From the Pas, the Saskatchewan flows through a low flat country, wooded with scrub poplar, balsam and spruce; the character of the country gradually deteriorates, the banks becoming lower and lower and the timber more scrubby and scanty; the alluvial flats are in many places only one or two feet above the water, and they are at some points covered with driftwood, showing that they are flooded at certain seasons."

"Opposite the Moose Lake branch, by ascending a tree, I succeeded in getting a view of the surrounding country; the banks are, here, three feet above the river, supporting a thin strip of grey willows along the water's edge, and about half a chain back from the river there commences an extensive marsh or swamp, with rank reeds and rushes, interspersed with ponds of open water and dotted with clumps or islands of balsam, spruce and willow as far as the eye can reach."

From Moose Lake Fork, for about sixteen miles further down, a slight improvement is observed on the immediate banks, occasional groves of young ash, elm and ash-leaved sugar-maple are seen, but the flats behind are generally very low, and covered only with grey willows and sapling poplar.

Between Marshy Lake and Cedar Lake are seen all the characteristics of a great alluvial delta.

Muddy Lake is a dilatation of the river. On an island in this Lake I found an exposure of light-colored limestone in horizontal beds along the water's edge. This was the first outcrop of rock *in situ* met with on the Main Saskatchewan.

Cedar Lake, thirty miles long by a breadth in widest part of twenty-five miles, is 60 feet higher than Lake Winnipeg, and is 688 feet above the sea.

The northern coast is deeply indented and very low, and the country continues flat for a long distance back. At some points and on many islands there are exposures of limestone in horizontal beds. "The mainland and islands are well wooded with balsam, spruce, birch, poplar, tamarac, cedar and Banksian pine, but a considerable portion of the land is reported to be swampy and unavailable for agricultural purposes."

53/101 The Saskatchewan crosses the northern portion of this section.

Hind's A. & S. Exp., Vol. 1, *pp.* 450-454.

Mr. John Fleming's journey, 16th August.—The Saskatchewan below Cumberland.

Between the mouths of the Bigstone and Tearing Rivers, the Saskatchewan flows occasionally among alluvial islands; its banks are now low, only two to three feet above the water, covered with grey willow and sapling poplar. The river gradually increases in breadth and volume of water. "Above camp this evening its breadth was 980 feet, and mean depth of 20 feet."

No material change in the character of the river and adjacent country. The tract of country back from the river is rather low and wet.

THE PAS OR CUMBERLAND MISSIONARY STATION, is situated at the confluence of the Saskatchewan and Basquia Rivers, a tributory about 200 feet wide at its mouth. The Root River also falls in three-quarters of a mile above. The river banks at the Pas are 10 to 12 feet high, composed of light-colored drift clay, holding pebbles and boulders of limestone; the surface soil is a dark, gravelly mould, well adapted for cultivation, but the surrounding country is said to be low and swampy with marshy lakes. "Barley and other crops growing here looked well and were just ripening."

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102 *Hind's A. & S. Exp., Vol.* 1, *pp.* 446-449.

Mr. John Fleming's journey, 12th August.—"The general character of the country we passed this day is excellent, the soil being rich and the timber of fair quality. The depth and breadth of the river is variable, being impeded by mud flats and shoals." "At noon, came to the mouth of a tributary (100 feet wide) from the north. We continued on to the "Pemmican Portage," leading to Cumberland House. We came to-day nearly 29 miles, so that the distance between Fort à la Corne and Cumberland, by the windings of the river, is upwards of 150 miles."

CUMBERLAND.

"The country round Cumberland is low and flat; the soil in some places is a stiff clay, but in general it consists of a gravelly loam a few feet in thickness, covering a horizontal bed of white limestone, and supporting a light growth of poplar and birch; occasionally, groves of spruce (the so-called pine of Rupert's Land) are seen here and there. The land being so little raised above the lake and river, a great deal of it is submerged during the spring floods, and some parts upon which the water remains becomes marshes and swamps, but many of them would be drained and improved without much difficulty."

"There are 10 acres enclosed and under cultivation at Cumberland. I observed a field of barley and another of potatoes, both looking well, and there is an excellent garden; the soil appeared rich and fertile, bearing an exuberant growth of rhuburb, cabbage, peas, carrots and other vegetables."

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103 *Hind's A. & S. Exp., Vol.* 1, *p.* 445.

Mr. John Fleming's journey, 11th August.—"Passed through an excellent tract of country all day, the soil on both sides of the river consisting of a very rich alluvial deposit, ten feet in thickness above the surface of the water, well wooded with large poplar, balsam, spruce and birch, some of the poplars measuring two and a-half feet in diameter; and, as far as I was enabled to ascertain, the land continues good for a great distance on either side, but more especially on south side of river. In many places the river is studded with large alluvial islands, supporting a most luxuriant growth of poplar and willows. Travelled a distance of about 47 miles to-day."

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104 *Hind's A. & S. Exp., Vol.* 1, *pp.* 441-444.

From Fort à la Corne, down the Saskatchewan to the Grand Rapids and Lake Winnipeg—by Mr. John Fleming, 9th August, 1858:—

SASKATCHEWAN (or "River that runs swift")—at Fort à la Corne, is 965 feet in breadth; mean velocity of current three miles an hour; its immediate banks are high; the sides of the valley, which are higher, being at no great distance from the river; the breadth of river continues very uniform, but its banks become gradually lower, the hillsides of the valley at the same time diverging. "About twenty miles below Fort à la Corne, the banks of the river are low, and the general character of the adjacent country considerably changed. The high cliffs before seen at the great bends give place to rich alluvial flats, supporting a forest of fair-sized balsam, spruce and poplar, and the valley becomes so broad that the high banks are nowhere observed." Made 23 miles the first day.

August 10th.—Passed during the day the "Big Birch Islands," and many others; they are all alluvial deposits and some of them are overflowed in spring. "The banks of the river are now quite low, and the country on either side is very flat, but it still continues well adapted for agricultural purposes and settlement, the soil being a rich alluvial loam of considerable depth, well watered and drained by many fine creeks, and clothed with an abundance of timber for fuel, fencing and building. Made 53 miles to-day."

Hind's A. & S. Exp., Vol. 1, pp. 397, 399 to 406.

FORT À LA CORNE.

"The Saskatchewan, opposite Fort la Corne, is 320 yards broad, 20 feet deep in the channel, and current of three miles an hour; mean depth 14 feet, but it has been crossed on horseback during a very dry season."

"The main Saskatchewan drains an area of 240,000 square miles, and mean discharge of water per second, 59,289 cubic feet."

"The river usually opens from 9th to 20th April, and closes from 6th to 13th November."

Nepowewin Mission.—"The area of fertile land here is limited to the points of the river, and does not exceed 400 to 500 acres."

Fort à la Corne to Birch Hills, across the country.—The trail "passes through a thick forest of small aspen until near the summit, when a sandy soil begins, covered with Banksian pine and a few small oak. This sandy area occupies a narrow strip on the banks of the river from a half to four miles broad. South of it the soil changes to a rich black mould distributed over an undulating country, where the pine gives place to aspen and willow in groves." "On the slopes the grass is long and luxuriant, affording fine pasturage. The general aspect of this country is highly favorable for agriculture, the soil deep and uniformly rich, rivaling the low prairies of Red River and the Assiniboine." Our course lay along the banks of Long Creek, which is six feet wide, flowing through a broad shallow depression, where wild hay is very abundant; ponds and lakes are numerous, pointing to a more humid climate than that south of the Qu'Appelle.

"The valley of Long Creek appears to furnish a very large area of land of the best quality, and will probably yet become the seat of a thriving community."

The South Branch of the Saskatchewan runs northerly and joins the North Branch in this section.

Hind's A. & S. Exp., Vol. 1, pp. 392-395.

On voyage down the South Branch of the Saskatchewan :—

The "surrounding country gave evidence of an excellent soil and timber sufficient for the first purposes of settlers. Much of the timber, however, has been burnt and the country is fast becoming an open prairie." The current of the river is here six miles an hour, with a fall of two feet in a mile. The hill-banks become higher as we approach the forks, showing fine exposures of drift.

"Six miles from the Grand Forks yellow clay cliffs 120 feet high appear." "Balsam spruce two feet in diameter are not uncommon."

On the voyage of 250 miles down the South Saskatchewan, an extraordinary absence of animal life was noticed.

"The very small number of tributaries received by the South Branch between the Elbow and the Grand Forks is a remarkable proof of the aridity of the region through which it flows. For nearly 200 miles it receives but one affluent from the east, and on the west side, where the water-shed is of much greater breadth, but where we would expect to find a more arid climate, it receives eight insignificant brooks. From Lumpy Hill to the Grand Forks, a distance of about 60 miles, four streamlets cut its eastern bank. The water-shed on the east side has not an average breadth exceeding twelve miles, and two of the tributaries proceed from ponds in valleys cutting the low dividing ridge, which, like those of the Qu'Appelle, are tributary to Long Lake or the main Saskatchewan."

THE GRAND FORKS OF THE SASKATCHEWAN.

The water of the South Branch is yellowish brown in colour; while that of the North Branch is a shade lighter and clearer. The former more resembled the waters of the Mississippi; the latter, those of the St. Lawrence; temperature of South Branch. 67°; of North, 62°. The South Branch is 180 yards broad, and the North only 140, and the currents three and a-half miles an hour. Ascended the North Branch seven miles; current here being from six to seven miles an hour. The valley as far as seen resembles the last ten miles of the South Saskatchewan.

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105 *Hind's A. & S. Exp., Vol.* 1, *p.* 396.

COAL FALLS.

Above the point reached, the hill-banks expose drift, in which are imbedded large masses of cretaceous rock, containing fish scales. Fragments of lignite are numerous, but no rock was seen in position. Breadth of valley is about one-half mile, and 150 feet deep; the low points are covered with aspen, the hill-banks with white spruce, aspen, Banksian pine and poplar. Below the Grand Forks there is an extensive flat.

Surveyor-General, Dominion Lands, Report, 1877—*A. L. Russell, D.L.S., pp.* 13,16 *and* 17.

At Prince Albert and immediate vicinity "there are nearly one hundred houses with a population of about 500 souls, principally English. This settlement is on the North Saskatchewan about 35 miles above the 'Forks.' Is in a thriving condition possessing two fine general stores, a splendid steam saw and grist-mill, also a water-power grist-mill, blacksmith shops, &c., Church of England Bishopric, and Presbyterian Mission and schools. The land here is very nearly equal in richness to the famous Red River Valley, the proportion of clay being somewhat less and the land more undulating."

"The crops are occasionally injured by early frosts, but last year a most abundant harvest was gathered." "Over 1,200 acres were under crop last year among the settlers on the river front, and many large fields were to be seen on Red Deer Hill and various other parts of our work. I noticed wheat, oats, barley, turnips, cabbage, carrots, onions, &c., &c., of equal excellence to those grown in Ontario."

Abundance of water and a fair supply of wood in this neighbourhood.

The road leading from Prince Albert to the Indian settlement, 14 miles S.-E., passes through a fine farming country.

Prince Albert to the Forks of the Saskatchewan River, 36 miles.—

"Excepting where a belt of pitch pine, about three miles in width, crosses the road on a poor sandy soil, the trail passes through a country well adapted to settlement."

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106 *Macoun Geol. Rep.*, 1875-76, *p.* 183.

Star Mission to Carlton, 50 miles.—The trail here crosses the south-west part of section.

"Nearly all the way, country is quite level and fit for farming purposes. Most of it is prairie, with an abundance of good water. When within 20 miles of the Saskatchewan, passed three salt marshes, but only one of any extent. The land is much better five miles from the Saskatchewan than close to it; have found it so in all cases. Near the river land was broken and contained much sand, but this was not noticed away from it." Computed distance from Fort Chepewyan to Carlton is 660 miles.

Surveyor-General, Dominion Lands' Report, 1878—*W. F. King, D.L.S., p.* 19.

The 12th correction line in this section is nearly all through a very sandy country, covered principally with Banksian pines. There are numerous muskegs in which water is strongly impregnated with iron, and which form the source of Beaver Creek.

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107 *Macoun Geol. Rep.*, 1875-76, *p.* 182.

The trail from Green Lake to Carlton, 140 miles—crosses the north-eastern portion of this section.

Second day " we crossed sandy tract, covered with Banksian pine," and numerous lakes of pure crystal water. " On 30th September, passed through thick forest of spruce, birch, aspen, poplar and occasionally Banksian pine of large size. Soil, rich sandy loam, which became drier as we proceeded, showing unmistakeably that we had passed the water-shed. We passed many fine timber tracts, country generally suited for agriculture. Next day no change except a gradual one to drier climate." "Aspen woods began to give place to prairie. Where fire had destroyed timber, prairie flowers were seen," " until the flora had lost its forest character and become almost identical with that of plains. At White-Fish Lake, the flora was that of prairies, shewing that line of permanent prairie was reached." After crossing stream, country became broken, and then number of swampy lakes.

STAR MISSION.

Mr. Hines, a practical man, in charge of mission, " early in spring (1875), had plowed land for the Indians. Wheat sown 10th May, was reaped 10th September, and barley, sown five days later, was reaped six days earlier. Showing that it takes nearly a month longer to ripen grain in this region than it does on any part of Peace River, hence a greater danger here of summer frosts. The prairie soil is sandy loam mixed with gravel; the poplar lands inclined to clay, and the bottom lands black loam." Mr. Hines stated that soil of whole region was as good as that which he was cultivating.

53
108 *Palliser, pp.* 68-69 (winter journey).

Through southern and western portions of this section.

JACK FISH LAKE, 20 miles long by 12 wide, its waters slightly saline, banks 100 feet high of sandy argillaceous drift.

The road to the west lay over very irregular ground, broken by abrupt ridges; in the hollows were small swampy lakes. Passed some sand hills, which rise from a level plain of considerable extent; crossed Turtle River, 40 feet wide, a tributary of the Saskatchewan; again crossed several sand hills, thence across English Creek and followed along the west side of a wide shallow valley, through which it flows from its source among low undulating hills.

The Red Deer Hill (at western side of section) is an abrupt terraced slope, the top of the hill is a level plain, presenting a different aspect to any I have yet seen, being covered with thick low brush and a few clumps of trees, and is traversed by deep steep gullies.

Sandford Fleming, Pac. Ry. Rep., 1874, *p.* 38.

"The country on the North Saskatchewan is but little wooded, but it abounds in grasses and the soil appears to be good, in some places somewhat sandy and arid. The contour of the land is irregular, with hills of considerable elevation, at the base of which lakes are frequently to be met, generally not of extended area."

Selwyn Geol. Rep., 1873-74, *p.* 34.

Along the trail on the north of the Saskatchewan,—"The soil for many miles in neighbourhood of Jack Fish Lake, is of finest quality a rich black loam on a blueish-grey clay." From this lake westward, a fine fertile country, tolerably level, with patches of aspen wood, and several saline and fresh water lakes. "At English River met with the first spruce since leaving Fort Ellice."

The Red Deer Hills rise from 200 to 300 feet above plain, of light sandy loam, stony and gravelly.

53
109 *Palliser, p.* 70.

"Fort Pitt stands on the left bank of the Saskatchewan."

The river here is 430 yards wide. The south bank of the valley rises to 500 feet. "Showing sections of upper and middle cretaceous strata, the country to the south of the river is hilly, with good pasture, but no wood. There is a total absence of wood in the neighborhood of the Fort, but an abundance of timber at a short distance to north-west. There is very fine pasturage and it is a favorite place for rearing horses. "Grain is said not to succeed well, but I suspect they have chosen a bad spot for their field; turnips grew well, and the place is famous for the quantity and quality of potatoes."

Sandford Fleming, Pac. Ry. Rep., 1874, *p.* 38.

"From Fort Pitt, continuing along the North Saskatchewan, the soil improves, and we met white spruce, tamarack and poplars, with thick and luxuriant grasses. Fires had passed over much of the country."

Selwyn Geol. Rep., 1873-74, *p.* 35.

Fort Pitt.—Soil in the neighborhood of Fort, rich black mould three feet deep, underlaid with coarse rounded gravel; on hills at back of Fort, soil brown sand and sandy gravel not suitable for cultivation; fine crops of barley and potatoes at Fort; wheat not grown.

From Fort Pitt to Frog Creek, along the trail on the north of river, " the country is of the usual hilly character, with intervening swampy flats and pools. Spruce trees are here tolerably abundant; there are also clumps of pine and a few larch trees. The soil is generally sandy and gravelly, with a thin layer of light black loam on the surface."

Mr. Marcus Smith,

In his journey of 1877, describes the country as seen from French Knoll to the north as thickly covered with poplar and some clumps of spruce, which latter was first seen at English River. The land to the west in this section, on road travelled, was poor, but some pea-vine grew among the brush.

Lt.-Col. MacLeod, C.M.G., Commissioner of Police, North-West Territories.

Travelled from Fort Pitt southerly through this section. He describes it as fair soil with pasture, but water saline.

Henry A. F. MacLeod, C.E.

Mr. MacLeod is intimately acquainted with this country, having had charge of the Pacific Railway surveys through this territory.—" The south-eastern corner is light sandy soil with good pasturage. The southern and western portion is good fertile soil, with wide marshes producing hay; towards the north, near Fort Pitt, it is fair soil. The willow hills descend gently to the plains on the north, and are more abrupt on their south sides. To the south of Fort Pitt the ground is also hilly, the hills are partly wooded, and the plains generally open. The water supply is good."

Surveyor-General, Dominion Lands' Report, 1878—*W. F. King, p.* 15.

The telegraph trail from Battleford to Edmonton passes North of Battle River through the southern portion of this section. The country here is a " wide stretch of plain," " covered with buffalo grass," with scarcity of water.

53
110 *Palliser, p.* 70.

From the Saskatchewan, at the mouth of the Vermilion westward.—Course lay across a wide stretch of prairie, passing many herds of buffalo, thence crossing a range of hills for five or six miles through a very broken country, made a rapid descent of 300 feet to an extensive plain covered with bluffs of poplar, which seemed to stretch for 10 or 12 miles, until it is again bounded by the same range of hills. Other similar extensive plains, some of them swampy, bounded by hills, were crossed in this section. The pasture is rich.

Henry A. F. MacLeod.

" The southern portion is good fertile soil, to the Four Blackfoot Hills, where the soil is gravel and clay, giving good pasture. The country is hilly, rolling, open prairie. The supply of surface fresh water is small."

Surveyor-General, Dominion Lands' Report, 1878—*W. F. King, p.* 15.

Following the telegraph trail westerly, across the southern part of this section, the first 20 miles passes through a wide stretch of plain, covered with buffalo grass, with scarcity of water, but "near Grizzly Bear Creek, about 100 miles from Battleford, we again get into a tract of 40 miles or more of good soil, rolling country with wooded hills and innumerable lakes."

53
111 *Palliser, p.* 71.

Crossed this section westerly about 15 miles south of Saskatchewan. "Entered a district of country exactly corresponding to the White Lakes between Fort Pitt and Carlton, forming what is known as the Chain of Lakes." From one of these lakes the Vermilion River rises, and flowing to the south-east, till far out in the plains, it makes an abrupt turn to north north-east to join the Saskatchewan.

"We left this chain of lakes, and crossed a very hilly country until we came to an immense swamp, on the further side of which is the hill known as 'La Butte Noir.'" To the north, between this trail and the Saskatchewan, the country is described as hilly, with clumps of wood and fine pasture.

Henry A. F. MacLeod.

"The southern portion is good fertile soil, improving to rich alluvial to the west; there are numerous marshes producing good hay. The country to the east is an even open prairie, the central part hilly and partially wooded, and the western part an undulating open prairie. The supply of fresh water is limited to the east, and abundant to the west."

Suveyor-General, Dominion Lands' Report, 1878—*W. F. King, p.* 15.

Continuing westerly along telegraph trail through southern portion of this section—the first 20 miles or so of the soil is good, and the country rolling, with wooded hills and lakes, for the remaining distance the country becomes poorer.

53
112 *Palliser, p.* 71.

The trail crossed this section westerly, about 15 miles from its northern boundary.—

Leaving "La Butte Noir," crossed a plain with long grass and clumps of willows for 14 miles. "We then came to poplar clumps, and at last fairly entered the woods. North and west of this there are no plains except of small size, completely surrounded with wood." Crossed several creeks, "continued to the west and a little south, over a country that is evidently very swampy at certain seasons, until we rounded the Beaver Hills, when we camped in a clump of pine"—20 miles from Edmonton.

Henry A. F. MacLeod.

"The southern portion is rich alluvial soil, extending westerly to the Beaver Hills, where the soil is good and fertile. There are numerous marshes producing good hay. The surface is an undulating, rolling prairie, and hilly to the west, heavily wooded on the Beaver Hills and open to the east. The water supply is good."

Surveyor-General, Dominion Lands' Report, 1878—*W. F. King, p.* 15.

Continuing westerly along the telegraph trail through southern portion of section, " another good tract occurs as we approach the Beaver Hills, 175 miles from Battleford. Going through this fertile stretch we reach Hay Lakes, at a distance of about 195 miles from Battleford."

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113 *Sandford Fleming, Pac. Ry. Rept*, 1874, *p.* 38.

" At Edmonton the question of coal first presents itself; some fragments were dug out of the river bank. Although they burned in a blacksmith's forge, evidently they were of an inferior quality; better samples were reported by the officers of the Hudson Bay Fort as having been found higher up the river."

" Looking back over the 1,000 miles of prairie country travelled since leaving the wooded district east of Manitoba, it is worthy of note, that absolutely level plains formed no great proportion of the vast area which came under our observation. We were agreeably surprised to find that by far the larger proportion was undulating and in this respect not unlike much of the Province of Ontario, while eminences of considerable elevation, not greatly inferior to the Mountain at Montreal, were occasionally met with. In many places small groves and fringes of trees adorned the prairie and gave the landscape an agreeable, park-like appearance."

Selwyn Geol. Rep., 1873-74, *pp.* 37, 38.

Vermilion Creek to Edmonton, 35 miles.—Stretches of open prairie well grassed, alternating with belts and patches of woodland; the greater part well adapted for settlement.

EDMONTON.

Edmonton House stands on left bank of the Saskatchewan, about 100 feet above river. At back of fort "gradual ascent of another 100 or 150 feet to general prairie level." " Banks of river valley from 190 to 250 feet high, and at most places densely wooded. Seven to ten miles back from valley, on either side, is a line of high ground rising from 200 to 300 feet above a willow covered plain."

At St. Albert R. C. Mission, 9 miles west of Edmonton, there is a fine farm and garden, with splendid crops of wheat, barley, potatoes and turnips; barley just cut, wheat not quite ripe, and some ears frosted; wheat hitherto uncertain, " but a more hardy kind, or fall sowing, might be tried and produce better results."

Mr. Selwyn also traversed this section, southerly from Edmonton on road to Rocky Mountain House, and describes the country as having a rich, black soil, swampy lakes, open, richly grassed prairies and patches of copse wood, with spruce and poplar trees.

Selwyn Geol. Rep., 1873-74, *p.* 50.

COAL.

" There can be no question that in the region west of Edmonton, bounded on the north by the Athabasca River and on the south by Red Deer River, there exists a vast coal field, covering an area of not less than 25,000 square miles:

and beneath a large portion of this we may expect to find workable seams of coal at depths seldom exceeding 300 feet, and often, as in the case of the thick seams above described, very favorably situated for working by levels from the surface."

Macoun Pac. Ry. Rep., 1874, *p.* 92.

" The climate in the neighborhood of Fort Edmonton and St. Albert Mission is favorable to the growth of all kinds of grain except maize." " In both localities, I saw wheat, oats and barley of excellent quality, and much taller than it is seen in Ontario."

Messrs. Horetzky and Macoun passed north-westerly through this section from Edmonton towards Lac la Nonne.

Horetzky's Pac. Ry. Rep., 1874, *p.* 46,

Describes it as a very fair country of an easy character, and land partly of prairie and timber.

Macoun's Pac. Ry. Rep., 1874, *p.* 68.

Between Edmonton and Lac la Nonne.—

Forty-nine miles by cart road; land rolling and rising into hills stretching to the west; none of it is difficult, but the latter part is much broken by hills, swamp and lake. About 40 miles from Edmonton is the height of land between the Saskatchewan and Athabasca.

Henry A. F. MacLeod.

"The southern portion is good fertile soil, with marshes producing good hay. About Forts Edmonton and Saskatchewan there is rich alluvial soil, with marshes producing good hay. About St. Albert's the soil is good and fertile, with marshes producing good hay. The surface is undulating, rolling and hilly. The valley of the Saskatchewan is deep and wide, as well as the valley of White Mud. The southern portion is heavily timbered with poplar and spruce, with occasional open prairies. The northern part is partially wooded; there is an abundant supply of good fresh water; coal is found on the banks of the Saskatchewan, and gold is washed on the bars of the river."

Surveyor-General, Dominion Lands' Report, 1878—*W. F. King, pp.* 15-16-17.

" At this point (Hay Lakes) we leave the telegraph line to go northward to Edmonton."

The Beaver Hill fertile region, however, appears to run a long way west of Hay Lakes, probably to the edge of the forest, and to south-west it runs to Battle River, to join the fertile belt, which runs along the upper part of that river. The Hay Lakes lie in Lat. 53° 11', and in Longitude by C.P.R. 30' 50" east of Fort Edmonton, the distance from that place being about 33 miles by trail. On this trail, seven miles from Hay Lakes, we enter thick bush, in which spruce may occasionally be seen, as well as a few spruce and tamarac muskegs, a sign of the proximity of the forest.

This bush extends nine or ten miles along the trail; crossing the " White Mud River, a small creek 16 miles from Fort Edmonton, we enter a beautiful fertile tract, a gently rolling country with numerous clumps of poplar and frequent lakes, this extends to the Saskatchewan River at Fort Edmonton."

Mr. King, in the autumn of 1877, ran several meridian and township lines in the neighbourhood of Edmonton and St. Albert Settlement, continuing his surveys as far as the 114th meridian.

He describes the country as of varying character, some more or less open, other thick poplar and spruce bush, and also swamp. "The 114th meridian runs through a flat country, drained by the Upper Sturgeon, and by the Rosebud River, which flows into the western end of Big Lake. Between this latter river which is a few chains south of the 14th Base, and the Upper Sturgeon River which is crossed by the meridian about 7½ miles north of the Base, the country is nearly all good prairie land, with heavy clumps of poplar, &c. North of the Sturgeon the country is open, and the soil is not so good. South of the Base the line runs through muskegs for nearly three miles, when, emerging from the valley of the Rosebud River, the Stony Plain is reached, which is, notwithstanding its misleading name, a very fertile region many miles wide. It is bounded on the north by a strip of large spruces.

"The 14th base, Lat. 53 ° 35' 52", leaving the Rosebud River to the south, runs into the Rosebud Hills, in which also there are many localities exhibiting good soil."

"The Edmonton Settlement extends along the Saskatchewan about 8 miles, principally on the north Bank, although a few settlers have taken up claims on the south side of the river. There are also several settlers along the trail from Edmonton to Big Lake. The soil throughout this Edmonton Settlement is excellent, and there is plenty of wood everywhere, while there is good pasturage a few miles away from the river."

FORT SASKATCHEWAN.

"The settlement here is chiefly on the north side of the river, opposite the Fort. The soil is very fertile, and settlers have large fields under cultivation. They have a water mill, just built (June, 1878) on the Sturgeon River, about 8 miles north from the settlement, in the centre of a most fertile, though at present unoccupied tract of land. A few miles north of this there is a large extent of fine spruce bush in the vicinity of Egg Lake, from which a large amount of building timber is procured." "The Fort Saskatchewan tract of good land extends southerly across the Saskatchewan to the Beaver Hills, and easterly across the Sturgeon River, as far as Vermilion Creek, 14 miles"

$\frac{53}{114}$ *Sandford Fleming, Pac. Ry. Rep.*, 1874, *p.* 39.

"On leaving Edmonton we passed through a country interspersed with hillocks, and we likewise occasionally met with swamps, many of which were covered with swamp hay. Gradually the country becomes more wooded, and the undulations assume a more marked character. More creeks were crossed, running in most cases through narrow valleys. The vegetation was particularly luxuriant, and the grass through which we passed was, in some places, from five to six feet high."

Henry A. F. MacLeod.

"Following the line of the Canadian Pacific Railway the soil is good and fertile. To the east of Lake St. Anne and to the north of Lake of Isles the soil is also good and fertile. To the north of White Lake the soil is fair; the surface is hilly and undulating; the eastern portion is partially wooded, and the western heavily, with fine poplar and spruce. There are numerous marshes producing good hay, and the water supply is abundant. Coal is found in large quantities on the banks of the Pembina River and the Saskatchewan. Gold is washed on the bars of the Saskatchewan."

53
115 *Sandford Fleming. Pac. Ry. Rep.*, 1874, *p.* 39.

"In crossing the River Pembina some 70 miles west of the River Saskatchewan, we found thick outcropping beds of coal. It proved much better than the Edmonton specimen, and we heard from our guides that abundance of this fuel was present at other localities, some of it of still better quality.

Occasionally the country becomes more open with groves of spruce, aspen and poplar, increasing in size. Nevertheless, much of it is densely wooded, while in other places the timber is thin and of inferior quality."

Henry A. F. MacLeod.

"To the east of Dirt Lake and to the south the soil is good and fertile, with marshes producing good hay. South of the Lobstick River the soil is fair, with marshes producing good hay. To the west the soil is fair, with muskeags. The surface is hilly and rolling, and heavily timbered with fine spruce and poplar. The supply of good water is abundant. Coal is found in large quantities in the banks of the Pembina River."

53
116 *Henry A. F. MacLeod.*

The central portion is poor, sandy clay and gravelly soil, with muskegs, except some of the flats of the McLeod River, and the valley of Medicine Lodge Creek, where the soil is fair. The surface is hilly and rolling and heavily timbered with fine spruce and poplar. Water supply abundant. Coal plentiful in the banks of the McLeod."

53
117 *Henry A. F. MacLeod.*

"The central portion to the east of Lac à Brulé is poor, sandy clay and gravelly soil, with muskeags, except some extensive flats on the Athabasca River and Prairie River, where the soil is fair. It is reported that bands of horses have been wintered on these flats. The Rocky Mountains rise immediately to the west of Lac à Brulé, and on each side of Fiddle River. The mountains are rock with a light coating of soil and moss in places. The surface is hilly to the east, mountainous to the west and south. The country is heavily timbered with fine spruce and poplar, except the flats above mentioned, which are open prairie. Water supply abundant. Coal is found in the banks of Coal Creek."

Palliser, p. 124.

Dr. Hector crossed this section from north-east to south-west, ascending the Athabasca.—

After leaving Baptiste Creek, "seemed to be passing through a range of hills, but although I ascended the bank for 250 feet, I could see nothing of the surrounding country, on account of the dense woods." After passing Old Man's Creek, "the banks (of the Athabasca) became low and covered with spruce, with large swampy flats at a little distance from the river."

Continuing to ascend the river, the valley is very wide with large alluvial flats, and the land rises into hills on either hand. On the terraces which rise to 370 feet, the soil is dry and gravelly, supporting a growth of cypress and pine.

Reached the point (on the western side of this section) where the River Athabasca emerges from Lac à Brulé, lying at the base of the Rocky Mountains, which rise from its western shore at least 3,000 feet; "its eastern shore is formed of immense sand hills."

53/118 *Palliser pp.* 124, 125.

Above Lac à Brulé entered a wide valley in the mountains, and reached the base of Myette's rock.

Jasper House (on the eastern side of this section) "is beautifully situated in an open plain, about six miles in extent, within the first range of the mountains."

Henry A. F. MacLeod.

"To the south-east the valley of the Athabasca is entirely in the Rocky Mountains. The bottom of the valley is generally a flat from one to two miles wide The soil is light, sandy, clay and gravelly, with muskeags in places. The sides o the valley are steep and generally rocky, in some places covered with a few feet o light soil, affording good pasture during the summer months. The big horn sheep is plentiful here. The valley is heavily timbered with spruce and poplar, except a few small prairies about Jasper Lake and to the north of Henry House. Water supply is abundant. Coal is reported in large quantities to the north of Jasper House."

FROM THE 100TH TO 119TH MERIDIAN AND BETWEEN THE 52ND AND 53RD PARALLELS OF LATITUDE.

52/100 Lake Winnipegosis occupies the eastern portion of this section.

Hinds, A. & S., Exp., Vol. 1, *p.* 433.

Mr. Dawson, in the spring of 1858, ascended Swan River in a canoe.

"About Swan Lake the country is highly interesting." "To the north an apparently level and well wooded country extends to the base of the Porcupine Range." "Ascending from Swan Lake for two miles the banks of Swan River are low, they then gradually become higher until they attain a height of 100 feet above the river. The current is here remarkably swift." "Landslips occur in many places where the banks are high, exposing an alluvial soil of great depth, resting on drift clay or shale of a slighty bituminous appearance."

"About thirty miles above Swan Lake the prairie region fairly commences."

Henry A. F. MacLeod.

"In the south-west of this, being the northerly end of the Duck Mountains, the country is hilly, the soil fair, and is heavily wooded with large spruce and poplar, and some marshes producing hay. Fresh water plentiful."

G. C. Cunningham, Pac. Ry. Rep., 1877, *p.* 186.

Mr. Cunningham had charge of this part of Pacific Railway Survey.—On the line of the railway between the 40 and 50 miles from Mossy Creek, observed some spruce trees 3 ft. 6 in. in diameter. On Duck Mountain there is a magnificent growth of white spruce; the quality of the timber is almost equal to that of first quality pine, and is remarkably sound. Up to 70 miles the line skirts the base of Duck Mountain, which is heavily timbered. After crossing Rolling River, at the 70 miles, entered a more prairie like district, and the timber, as a general rule, is very light, with intervening stretches of prairie; but in the river valleys and gullies, timber bluffs, affording white spruce and tamarac, occur.

SWAN RIVER VALLEY.—"The valuable part of this valley, or rather basin, begins at the eastern slope of Thunder Hill, and extends in a north-easterly direction to the Swan Lake. It is bounded on the north and north-west by the Swan Lake and Porcupine Mountain, on the west by Thunder Hill, on the south by Duck Mountain, and on the east by an elevated ridge lying between it and Lake Winnipegosis. Its extent is about 60 miles in length by 20 miles in width; the soil is remarkably rich and productive. Throughout it consists of large plains clothed with tall succulent grass, alternating with strips and clumps of timber well grown and admirably adapted for building purposes. Near Swan Lake may be seen spruce, tamarac, oak, elm, maple, birch and poplar, each species being represented by trees of very considerable growth."

52/101 The Porcupine range of hills occupies the central part of this section. Swan River crosses the south-east corner of this section.

Hind, A. & S. Expn., Vol. 1., *p.* 434.

Mr. Dawson's description.—"There the river winds about in a fine valley, the banks of which rise to the height of 80 or 100 feet. Beyond these an apparently unbroken level extends on one side for a distance of about 15 or 20 miles to the Porcupine Hills, and for an equal distance on the other, to a high table land called the Duck Mountain. From this, south-westward to Thunder Mountain, the country is the finest I have ever seen in a state of nature."

Henry A. F. MacLeod.

"The valley of Swan River contains good fertile soil partially wooded; with marshes producing good hay. The south-east corner is fair soil, hilly and heavily wooded with good spruce and poplar. Water is abundant."

See also Section 52/100 for Mr. Cunningham's description of Swan River Valley.

52/102 *Henry A. F. MacLeod.*

"The south-east corner is fair soil, thickly wooded with poplar and small spruce. Surface hilly with marshes producing good hay. Fresh water abundant."

52/103 *Henry A. F. MacLeod.*

"The south-eastern part about Nut Hill is fair soil, improving to the south-west, which is good fertile soil. The woods are light at the south-east and north; at the south-west corner there is an open plain; the surface is even and undulating. Water supply good."

52
104 *Henry A. F. MacLeod.*

"To the east and south, the soil is good and fertile; to the south-west it is fair; the country is open plain to the south-east, and partially wooded to the south-west. Surface even and undulating. The supply of fresh water is good."

Surveyor General, Dominion Lands, Rep. 1877, *A. L. Russell, D.L.S., p.* 12.

Along meridian ranges 16 and 17, West.—This Meridian line enters the south side of the section above Big Quill Lake and runs from 3 miles south of the C. P. R. line, through rising ground densely wooded with large poplar, and numerous ponds, up to the 10th base line, a distance of about 13 miles.

The 10th base line runs westerly from the above-mentioned Meridian. "The wooded and pond country continues for about 27 miles, when the country becomes more open and inviting."

52
105 The South branch of the Saskatchewan runs through this section from south-west to north-east. Mr. Hind travelled down the river, and the following are extracts from his description relative to this section.

Hind, A. & S. Exp., Vol. 1, *pp.* 388-391.

At eighty miles above the Grand Forks the River is 200 yards broad, but deep and swift; the volume of water much less than at the Elbow. No doubt evaporation during its course through arid planes is competent to occasion a large diminution. Recent water marks shew a rise of five and eight feet.

"On both sides a treeless prairie is alone visible;" prairie level, 80 feet above river; about 10 miles lower down, river ½ mile broad; prairie, as before, treeless. A few miles further down, the hill banks begin to increase in altitude to about 100 feet.

At 50 miles above the Grand Forks, "the woods," as they are termed, begin; they consist of a few aspen clumps on the hill and banks of the deep valley; the face of the country is changing fast and is becoming more undulating, patches of aspen shewing themselves on the prairie; occasionally the remains of heavier growth are visible, clusters and blackened trunks 10 and 14 inches in diameter. The balsam-spruce begins to appear in groves. The river winds in valley, three-fourths of a mile broad, between high wooded banks with aspen and spruce groves; the flats are covered with rich profusion of vetches, grasses and rose-bushes. Traces everywhere of a former fine aspen forest, with clumps of elm and ash.

"During the whole afternoon we passed swiftly through a good country, well fitted for settlement, as far as we could judge from soil and vegetation." "Low islands are numerous in the river, and extensive alluvial flats spread out in the expansion of the valley."

Mr. Hind also traversed this section by land south-westerly from the Birch Hill to Lumpy Hill, and thence south-easterly.

Hind A. & S. Exp., Vol. 1 *pp.* 406-411.

The Birch Hills range is said by Indians to extend to the rear of Fort Pelly, and forms the dividing ridge between the water which flows into the main Saskatchewan and the Assineboine, or Red Deer and Swan Rivers.

"The valley of Long Creek offers by far the most attractive features for settlement of any part of the country through which we have passed since leaving Prairie Portage."

Birch Hills to Lumpy Hill—

Followed through broad valley, rich in alluvial meadows, ponds and lakes, with hills on south-eastern side gently sloping towards it and covered with the dead trunks of burnt aspens. The soil is similar to that of Long Creek, Passed near source of Carrot or Root River, which rises within 12 miles of south Branch, and drains an extensive area of wooded country, and passing on its course through numerous lakes, falls into the main Saskatchewan at the Pas.

Lumpy Hill is about 400 feet above the general level; from its summit an undulating open country, dotted with lakes and flanked by the Birch Hills is visible towards the east; south and south-west is a lake region, also north and north-east. These lakes are numerous and large, often three miles long and two broad.

The view extends to the borders of the wooded land; beyond is a treeless prairie.

Much of the soil on the south and east of the Lumpy Hill is sandy and poor. We had now reached the limit of the good land, and were about to enter upon a comparatively sterile country.

Low hills and long ridges diversify the general level of the prairies, as seen from Lumpy Hill. "This eminence consists of drift sand and clay."

From Lumpy Hill to Big Hill.—The trail taking an easterly direction, passed over a series of hills and intervening valleys, constituting a height of land. Thence the vegetation still continues luxuriant; lakes are numerous; aspen groves and flowers abundant. As we approach the great prairie, the country becomes more undulating, and the soil light colored and poor.

The aspens are still large, although many of them have been destroyed by fire.

After traversing a very undulating country, in which are low ranges of hills and conical mounds with limestone boulders on their summits, arrived at Big Hill, on the top of which large granite or gnessoid and limestone boulders are strewn.

"The limit of the so-called wooded country is about 70 miles from the North Branch, and 30 miles from the South Branch."

Leaving this hill, the trail winds through a dreary labyrinth of dome-shaped hills, many of them covered with boulders; small aspens alone are found on low ridges or near ponds. A better country is then entered, but still undulating, containing many lakelets fringed with aspens; the soil is light and the herbage scanty.

Sandford Fleming, Pac. Ry. Rep., 1874, *p.* 37.

"Before reaching the South Branch of the Saskatchewan, the country is an agreeable mixture of woodland and prairie with several lakes of moderate dimensions, and with a rolling succession of knolls. The landscape was unusually pleasing, the soil excellent, and we saw abundant wild flowers Very many of the lakes are brackish, yet they often adjoin fresh-water lakes; the latter we found invariably at a higher level. At the foot of a ridge they are more frequently saline; on mounting the slope they prove to be fresh. At one place, we witnessed a fresh-water spring at the edge of a lake, the latter so saline that the horses would not drink the water."

Mr. Selwyn crossed the south-west portion of this section along the road from Touchwood Hills to Carlton.

Selwyn Geol. Rep., 1873-4, *p.* 30.

He describes the country to Big Hill, or Mount Carmel, as more undulating, and for the most part open prairie; wood and water very scarce.

Big Hill, or Mount Carmel, "is 140 to 160 feet above road at base, and is composed of drift. As far as eye can reach, similar hills and ridges without definite arrangement or parallelism are seen."

From Big Hill to the Saskatchewan opposite Carlton.—

Low drift hills interspersed with many lakes and pools, clumps and patches of copsewood, with intervening grassy plains.

Henry A. F. MacLeod.

"The southern part is light gravelly soil, improving to the south-east where it is good and fertile. To the east of Gotland the soil is light, improving to the west, where it is good and fertile.

About the centre the soil is good, giving excellent pasturage; and in the neighborhood of Duck Lake the soil is good and fertile. To the south-east and north the country is partially wood, and to the south-west prairie land; the surface is hilly and undulating. Fresh water in limited supply to the south, but abundant to the north."

Surveyor General, Dominion Lands, Rep. 1877, *A. L. Russell, pp.* 12, 15, 16.

The 10th Base line (latitude 50° 11"), continues westerly through the southern part of this section; for the first 10 miles the country is "open and inviting," "when we gradually descend into an almost barren, rolling, alkaline, sandy plain, where a few stray buffalo were occasionally seen."

Surveyor General, Dominion Lands, Rep. 1878, *Mr. A. L. Russell, p.* 13.

Describes the northern portion of this section as admirably adapted to agricultural and pastoral purposes, well watered with streams and ponds, and fair share of rather small sized poplar.

"The land to the south-east, of Prince Albert Settlement, across the South branch of the Saskatchewan, is superior in many respects to that lying between the two branches, which is rather rolling, light in places, and broken by ponds; whereas that to the east and south has gentle slopes and a uniformly excellent soil of about 8 to 10 inches of dark rich loam underlaid by a not too stiff clay."

"During the six years I have spent in surveys in various parts of Manitoba and the North-West, I have never seen greater luxuriance of growth than that here, nor do I consider the soil of that Province, which is frequently a stiff clay, as inviting to the farmer as the more friable soil of this section."

"Except along the main streams, where spruce, tamarac and jack pine are met with, very little timber suitable for building purposes is to be found, although a sufficiency for fencing exists almost everywhere.

"A large quantity of the best wood along the main Saskatchewan River is annually culled out for the Hudson's Bay Company's steamboats. Already Settlers are taking up land at the "Forks," and east and south thereof, in view of the possibility of future railway facilities in addition to the means of communication afforded by the Saskatchewan.

Prince Albert to Canada Pacific Railway Line, 90 miles.—"The first 20 miles (a part of which is in sec. $\frac{53}{105}$) pass through an excellent farming country, which continues good as far as the lower (Garrieppy's) crossing (of the Saskatchewan, about Lat. 52° 50′, Long. 106°) where on the east bank are several settlers, who speak favourably of their claims." Thence south-west for the next 10 miles to the Big Hill, "Minitchinasse," the road passes through the belt of timber skirting the river.

From the Big Hill to the Canadian Pacific Railway Line, the road runs through a hilly country with occasional groves of wood and lakelets, but for the most part the land is too sandy and broken for agricultural purposes.

52/106

The South Branch of the Saskatchewan traverses the south-eastern portion of this section.

Hind's A. & S. Exp., Vol. 1, p. 387.

Mr. Hind travelled down the river.

Beyond the Moose Woods the banks of the river are 60 feet high; breadth of stream, 250 yards, with current of three miles an hour. "On the east bank the prairie is occasionally wooded with clumps of aspen, on the west side it is treeless and shows many sand hills."

Palliser, pp. 57, 58.

The Palliser expedition travelled from the Elbow of the South Saskatchewan on the west of that river to Carlton House, and passed diagonally through this section from the south-west to Carlton.—

From point opposite Moose Woods to Stone Indian Creek, level plains, very poor soil, profusion of boulders, ridges of poplars lying north-west or north and south, between swampy hollows.

Thence to Fort Carlton, five miles through rich grassy land of first-rate quality, lightly wooded with clumps of willow and poplar.

Palliser, pp. 63, 64, *and notes on map.*

Saskatchewan near Carlton.—

River is 440 yards wide at high water, at low water it is 12 feet deep; the channel is clear, valley 195 feet deep; the alluvium bottom is often three times the width of the stream, affording much rich land. The country along both sides, where back from the river bank, forms exceedingly rich pasturage abounding in vetches, interspersed with small lakes and clumps of aspen and poplar. Distribution of the wood is most beautiful, but the timber is of no value except for firewood.

Round the swampy margins of some of the lakes there grows an abundance of goose grass, on which horses fatten almost as well as on grain. Poplar is the principal wood near the fort; down towards the Forks of the Saskatchewan, large forests of pine and spruce occur, and up the river about 30 miles there is a gully from which birch is obtained for cart axles, &c., for which hard wood is required. Their best timber is, however, brought from Shell Creek, 60 miles to the north.

THICKWOOD HILLS, 25 miles north-west from Carlton.—After ascending the left bank of Saskatchewan, which is 200 feet high, we passed to west through rolling country covered with poplar clumps and small lakes. Thence north-west reached a lake at foot of a conical knoll, its waters proved to be saturated with salt, and on the shores crystals of sulphate of soda were lying heaped up, many of them of large size.

Ascending the conical hill, which is called by the Crees "Manitoe's Rest," it is quite covered with grass to the top, and is probably composed of a patch of cretaceous strata, such as was seen at the Elbow of the South Saskatchewan. Indeed the whole eastern slope of the Thickwood Hills, with its broken country strewn with boulders and worn into conical knolls and deep pot holes, forcibly reminded me of the country where that river intersects the Coteau des Prairie.

Thence following cart track, reached a large clear lake several miles in length, and surrounded with dense pine forests. "The margin has been encroached upon by a dense growth of sphagnum moss, with dwarfed and contorted spruces and larches, for the most part dead, the whole forming what is known as a muskeg, favorite habitat for cranberries." "As swampy lakes of this description form the mass of what should be dry land in the district between Lake Winnipeg and Hudson Bay, they give the name to the Indians of that region, a sub-tribe of the Crees, known as Muskegoes or Swampy Indians." "Besides the 'Abies Alba,' which is the largest and best timber of this country, I observed a few larches, called here juniper, but they always die before reaching any size." The country between Muskeg Lake and the mountain is very broken.

Ascending the Thickwood Hills, "Passed through dense thickets of poplar. On gaining the highest level, I found that the hills were really a lofty table land, which has an irregular surface covered with swampy lakes and thickets, and it is only the rugged escarpment to the east that gives them the appearance of a range of distant hills."

Capt. Palliser, in his journey from Carlton to the Forks of the Medicine and Red Deer Rivers, travelled through this section on the south of the Saskatchewan.

Palliser, p. 83.

Carlton to the Elbow of the North Saskatchewan.—Passed over fine rich country and level plain 210 feet above the river to Birch Gully. The valley of the North Saskatchewan at the Elbow is not luxuriant, aspen and poplar being the only trees. From Birch Gully to Cross Woods, an irregular country, the large timber was all burnt off. Only stunted willows remained.

Sandford Fleming Pac. Ry. Rep., 1874, *p.* 38.

"The crossing of the South Saskatchewan is about 250 yards wide; the banks are about 170 feet high; the eastern bank, however, has the greater elevation; aspens, balsams, poplars and small white birch are found on its banks; the valley of the river, however, extends over a mile in width. The North Saskatchewan is 18 miles distant, and it is here that Fort Carlton is established. Between the two rivers the country assumes the appearance of a level plateau elevated about 300 feet above the stream. The soil, although light, is of good character; the North River at this spot is somewhat broader than the South Branch. The streams unite near the 105th degree of longitude and discharge into Lake Winnipeg. Only one rapid of any great importance is met in this distance."

Mr. Selwyn entered this section on the east side by trail leading through Carlton, and thence westerly towards Edmonton.

Selwyn's Geol. Rep., 1873-74, *pp.* 32-33.

Crossing of South Saskatchewan.—The river is here 200 yards wide, with strong current, and the extreme width of the valley is two miles; descent to river by steps or terraces, and also at other places abrupt wtih cliffs 150 feet of brown earthy clay or loam, with occasionally imbedded boulders; ironstone nodules, some of large size, are abundant among boulders. No unmoved rocks in this vicinity.

CARLTON HOUSE is situated on North Saskatchewan, 19½ miles from crossing of South Branch.

The Fort stands on a terraced flat of limited extent, about 200 feet below the level of the plain. Between it and the river a second narrower terrace or alluvial flat borders the river; a short distance above the Fort, on the left bank, the terraces terminate, and a single steep slope rises from the margin of the river to the plain; while on the opposite side the terraced character of the valley appears to have been modified by successive land slides, producing a; wide broken surface of irregular hills and hollows, which are for the most part thickly wooded. The river at Carlton is 400 yards wide, with an extreme depth of about 10 feet.

Carlton to Thickwood Hills.—For first two miles soil very light and sandy; at Creek-on-prairie extensive grassy swamps; thence 16 miles over very hilly and broken country to Redberry Creek, falling into Redberry Lake, the water of which is salt. This is at the base of Thickwood Hills, which form the ascent to the Third Prairie Steppe.

These hills are rough and stony, and boulders again become numerous. The country is well wooded and grass abundant.

Henry A. F. MacLeod.

The southern portion is poor gravelly soil, affording good pasturage, improving to the south-east to good fertile soil, and to the west, about the South Saskatchewan, to fair soil; the central and northern part, to near Carlton, is good fertile soil; the southern portion is open prairie, and to the north partially wooded. The surface is hilly to the south-east, and even and undulating to the west and centre; the supply of water is limited, except in the two Saskatchewans. The valley of the South Saskatchewan is not very large at the railway crossing, but increases in width and depth to the upper trail crossing; that of the North Saskatchewan is wide and deep.

Surveyor-General of Dominion Lands Report, 1877—*A. L. Russell, D.L.S., pp.* 12-13

Third principal Meridian, Longitude, 106° West, runs from the 10th base line in Latitude 52° 11' for 67 miles north.*

" For about twenty-four miles the line runs through the same sandy rolling plain.

" On the thirteenth mile we crossed the Canadian Pacific Railway Line where it deflects to the north, two miles south of an alkaline lake, 2¾ miles across. This lake has a very striking appearance, the shores being fringed with a crimson coloured weed, which disguises a wide, miry sandy margin

" At the Latitude of the eleventh Base the main Southern trail to Carlton is crossed, and here the land gradually improves, and fresh water ponds and groves of timber abound.

" The South branch of the Saskatchewan River is crossed at 1¼ miles north of the 12th Base line, about one mile below the lower (Garrieppy) crossing. The river here is 400 yards wide, with steep banks about thirty feet, and a current of two miles an hour. The lower crossing is on the shortest road to Prince Albert Settlement, and is seldom used by other than those going thence.

" Shortly after crossing this stream, we entered on a tract of great fertility and crossed the holdings of some English-speaking farmers, who praised the country and are entering heartily into the tillage of the soil and stock-raising."

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* This may be considered the corrected Meridian: it is about ten miles east of the Meridian line, 106° W. Longitude, shown on the accompanying map. The descrepancy arises from the fact that the true Longitudes of localities had not been determined when the original copy of this map was prepared. The correct position of the Meridian has only recently been established.

Surveyor-General of Dominion Lands' Report, 1878—*J. S. Dennis, jun., D.L.S., p.* 21.

Tenth base line continues westerly through this Section in Latitude 52° 11".

"The South Branch of the Saskatchewan was crossed on this line at 25 miles from the 106th meridian. The river here is some 12 chains in width, with a very strong current; the banks are low and edged by a mud deposit of the river, not of any width that would be of use for cultivation." The soil along this Base line through this Section "is of a very poor nature, being light and sandy and in most cases alkaline."

Surveyor-General of Dominion Lands' Report, 1878—*W. F. King, D.L.S., p.* 19.

Twelfth Base Line, Lat. 52° 53' 26", westward from 106th meridian to Carlton.

"I began the 12th base from the 106th meridian, on the eastern side of the South Saskatchewan, and ran it down to the water. Next day we crossed the river, which is here 400 yards wide, and produced the line through a thick belt of tamaracs that extends along its western bank. Ascending the hill to the west the line ran into thick poplar bush. The country here for some distance is a network of lakes, the shores of which are covered with thick growths of willows, &c. The soil is sandy. This sort of country extends for some two ranges, with only about three miles intervening of ordinary prairie. After this, in the third range, the country becomes open, but the soil is somewhat light for cultivation. In the fourth range west of this principal meridian, the line strikes the North Saskatchewan at the end of the twentieth Section from the meridian, and at about three miles north-east of Fort Carlton."

Surveyor-General of Dominion Lands' Report, 1878—*M. Aldous, D.L.S., p.* 24.

"St. Laurent.—This settlement extends along both sides of the South Saskatchewan River, from its intersection with the 3rd principal Meridian south to 'Gabriel's Crossing,' a distance of over twenty miles."

"When camped near 'Batoche's Crossing,' convenient opportunity occurred of taking a cross section of the South Saskatchewan River, which it will be interesting to compare with one taken of the North Saskatchewan at about the same time last season. The results were as follows :—

"Velocity (mean)	1·875	miles per hour.
Width (from water to water)	613	feet.
Greatest depth	9	"
Mean depth	4·58	"
Sectional area	2,811	square feet.
Discharge	about 8,000	cubic feet per second.

"Results of Cross-section of North Saskatchewan River, taken September, 1877 :—

"Velocity = 1·9125 per hour.
Width (from water to water) = 907 feet
Greatest depth = 8.3 "
Mean depth = 6·1 "
Sectional area = 616·8 square yards.
Discharge = 15,620 cubic feet per second.

" That portion of the South Branch which has come under my observation is very free from obstructions, not a single sand bar was noticed in the whole distance traversed, while, taking a similar distance on the North Branch, there will be found fifteen or twenty shifting sand bars. The water this season was, I estimate, eighteen inches lower than at the same date last season. Taking this into consideration, the measurements would go to show that the amount of water flowing through the South Branch is about seventy per cent. of that flowing through the North Branch. Notwithstanding this difference of volume, it is my opinion that navigation on the South Branch can more easily be effected than on the North Branch.

" The entire population of St. Laurent consists of French Half-breeds, who, with few exceptions, live by buffalo hunting. They simply farm sufficient land to provide themselves with grain and vegetables for their winter use; they, nevertheless, fully understand the advantage of securing land, being well aware that, in a very few years, the buffalo will be exterminated, and that then they will be compelled to turn their attention to agricultural pursuits.

" There are numerous large hay meadows in the rear of the settlement, from one to two miles from the river. This hay is cut and stacked in the autumn season, and furnishes abundance of fodder for their large bands of horses during the winter months.

" The land on the east side of the river is generally of an excellent quality and such as can be farmed to advantage, while on the west side, except in small tracts, it is very light and sandy, and unfit for cultivation."

Surveyor-General of Dominion Lands' Report, 1877—*A. L. Russell, D. L. S., pp.* 14-15.

Duck Lake—" This settlement lies about nine miles west of St. Laurent, and twelve miles south-east of Carleton House. Apart from an extensive trading establishment and a few Indians located here, there are not, probably, over fifty settlers, principally French Half-breeds." The good land hereabouts is rather limited.

Carleton House—" Last in order of population, but first as regards importance throughout this country, is Carleton House; the headquarters of the Hudson's Bay Company, in this most important District."

"Carleton House is situated on the east bank of the North Saskatchewan, about forty miles south-west of Prince Albert, in Latitude 52° 52½' N. There is no settlement in this vicinity; the land, except on the very limited interval, being inferior in quality. The Hudson's Bay Company's steamer 'Northcote' made five trips to this point and one to Edmonton during the past summer."

$\frac{52}{107}$ Captain Palliser entered this section about latitude 52° 15", and travelled westerly.

Palliser, pp. 83, 84.

Crossed Eagle Hill Creek, valley 130 feet deep, but little wood, small birch and poplars, and berry-bearing bushes; thence 15 miles over undulating prairie, with numerous salt lakes, to the base of Eagle Hill, 600 feet high; elevation above sea, 2,328 feet; eastern ascent steep and difficult; descent of their western flanks scarcely perceptible.

Eagle Hills to Ear Hills.—Plain, with little wood or water; soil impregnated with sulphates of soda and lime; very poor grass; small prairie flats between ridges of Ear Hills, but barren, nothing but small bushes on hills.

Captain Palliser also crossed S. E. angle of this section. See section $\frac{52}{106}$.

Mr. Selwyn passed through northern part of this westerly, towards Jack-fish Lake.

Selwyn Geol. Rep., 1873-74, *p.* 33.

From "Bear Paddling Lake," for 30 miles, the country is almost bare of wood; ridges and hills of sand and gravel. Soil generally light and poor; several grassy-edged lakes and pools, many of them salt, and boulders of gneiss scattered over surface.

Henry A. F. MacLeod.

"The southern portion, and extending to the Eagle Hills, is fair soil, improving to the north-east to good soil; on the Eagle Hills it is light gravelly soil, affording good pasture. To the north of the Saskatchewan, the soil is good and fertile; the surface is even and undulating to the east and north, and hilly to the south-west; fresh water supply good. The valley of the Saskatchewan is wide and deep.

Surveyor-General Dominion Lands' Report, 1878—*J. S. Dennis, jun., D.L.S., p.* 21.

The 10th base line continues westerly through this Section in Lat. 52° 11'. "The soil on the part surveyed of this Base, with the exception of some few miles in the Eagle Hills, is of a very poor nature, being light and sandy, and in most cases alkaline," unfit for agricultural purposes, and almost destitute of wood and water.

$\frac{52}{108}$ Captain Palliser entered this section about latitude 52° 15' and passed through to the north of Ear Hills, and across the valley to the Wigwatinon. See sec. $\frac{52}{107}$ for description to Ear Hills.

Palliser, page 85.

Country in neighborhood of Ear Hills is irregular, of rounded mamelons of almost pure sand, with numerous saline lakes; the soil and vegetation very inferior, probably the same character extends up to valley of Battle River. The valley of Wigwatinon running north-east and south-west, 200 feet below prairie level, is dotted with saline lakes; north end of valley clothed with aspen, the finest we have seen in the country; also, small quantity of a kind of sugar maple, and a large grove of ash-leaved maple. As a rule this region is desolate and barren, the whole country to the north has the same irregular features; soil for most part sandy; to the south and west a flat expanse of prairie extends to the horizon.

Henry A. F. MacLeod.

"The central portion of this section is covered by the Eagle Hills, and the north-western by the Wolf Hills. The former are high hills with light gravelly soil, affording good pasturagé, and the Wolf Hills are sandy knolls, also good pasturage. There is some fair prairie land about Raith. At Battleford, and on the north side of the Saskatchewan the soil is good and fertile, without woods. The hills are partially wooded with poplar. Water supply good."

Mr. Wm. Ogilvie, D.L.S.

Mr. Ogilvie, who has been engaged in surveys and explorations in various parts of the North-West Territories during last year, 1878, under the Department of the Interior, travelled through this section from Battleford south-westerly, and thus describes it:—

"Leaving Battleford in a southerly direction and continuing so for about five miles, the soil sandy and grass light, many alkaline ponds, some patches of light poplar woods around and near the ponds; thence in a south-westerly direction about four miles, to the bottom of a ridge, which runs in an easterly and westerly direction, and rises about 200 to 300 feet; the soil pretty fair, clayey loam, and gravelly ridges; grass good. Along the slope of the ridge mentioned are many ravines in which wood and spring water are found: the wood small poplar. Thence in a generally southerly direction, about 10 miles over gravelly loam, grass pretty good; here are some ponds, mostly alkaline; one about two miles long and about one fourth of a mile wide, runs north and south. Thence westerly over gravelly ridges, and flats of good loamy clay soil for about 10 miles, fresh water ponds, and bed of dry creek. No wood near or in sight."

Col. MacLeod and Capt. Clark also travelled southerly from Battleford through this section. See sec. $\frac{51}{109}$.

Battleford, the seat of Government of the North-West Territories, is situated near the junction of the Saskatchewan and Battle Rivers.

The Government House, Stipendiary Magistrate and Registrar's Offices stand on the height on the south side of Battle River, about 200 feet above the water.

The Post and Telegraph offices, Traders' establishments and other Settlers' houses, are built between this height and the river.

And the Police Barracks on a plateau about 100 feet in height between the rivers.

The population is probably nearly 100. The banks of Battle River and the south bank of the Saskatchewan, in this neighbourhood, are sufficiently low to afford easy approach to the navigable water; whereas, the bank on the north side of the Saskatchewan is much too high and steep for that purpose.

When the water is at a good height, the Saskatchewan steamers can enter the mouth of Battle River, and ascend to the Ford opposite Government House, but this cannot be done at low water.

Navigation of Saskatchewan.—The navigation of the Saskatchewan, in the vicinity of Battleford, is of the same character as the greater part of the river from a point a short distance below Prince Albert to Fort Pitt, that is to say, rendered somewhat difficult by shifting sand-bars. From Fort Pitt to Edmonton, the river is better suited for navigation, the water being deeper, and the channels permanent.

From the point, referred to, near Prince Albert down to the "Grand Rapids" of the Saskatchewan near Lake Winnipeg, the obstructions to navigation consist principally of shallow rapids, having but little fall over beds of boulders.

The Hudson Bay Company have two steamers on this river, running between the Grand Rapids and Edmonton, one of these is constructed of steel and the other of wood; the former of about 70 tons and the latter of about 150 tons burthen, both drawing from 1½ to 2½ feet of water.

Surveyor General Dominion Lands' Report 1878—*J.S. Dennis jun. D.L.S., pp.*21, 22.

The 10th Base continues westward for 25 miles to the Meridian, range 18 and 19. The soil is of a very poor nature, being light and sandy, and in most cases alkaline; none of it is of any use for agricultural purposes.

"I experienced great difficulty in making progress on the 10th Base owing to the want of wood and water, the country along that line being almost destitute of both. On one section of it water had to be carried for the party, and wood for posts and fuel, in our carts for a distance of 32 miles."

"The country along the Meridian (See note page 71) from the 10th Base to the 11th Correction Line (about 37 miles), is of a better nature than that on the 10th base for although the soil is light it is well watered, and the pasturage is excellent, it is however, destitute of wood."

"The 11th Correctional line runs (in about Lat. 52° 43' from the Meridian, ranges 18 and 19 to Battleford, about 16 miles) through the hills on the south side of Battle River Valley, and is in bush nearly all the way. The soil is generally exceedingly poor, and although improving a little in the immediate vicinity of Battleford, is even there very light and sandy."

Along the 11th Base line, Lat 52° 32' 13", from the Meridian between ranges 18 and 19, about 17 miles in this section, Mr. Dennis describes the country as decidedly more attractive, with good water, but a scarcity of wood.

$\frac{52}{109}$ Capt. Palliser crossed this section about its centre, travelling westerly.

Palliser, p. 85-86.

From Wigwatinon Valley to Nose Creek.—A few miles west, came to a valley about 10 square miles in extent, with soil of excellent quality, of rich black vegetable mould two and a-half feet deep, on fine yellow sand; thence passed over sand hills and a succession of poplar-covered ridges, with some fine sugar trees; irregular country to north and north-west. "After an abrupt ascent of 240 feet, a fine level prairie stretches away to the south as far as the eye can reach."

Neutral Hills could be seen twenty miles distant. They are the recognized boundary between the Cree and Blackfoot tribes. At nine miles east of Nose Creek, came on what was once forest land, but now, only dotted with small clumps of poplar and several salt lakes. The soil in many parts consists of one foot of black vegetable mould, excellent nutritious grasses, and many plants seldom found but in forests. The greater part of the country with these features is fit for immediate settlement. The spring here is early and the summer not too dry.

Henry A. F. MacLeod.

"The north-eastern corner is partly covered by the Wolf Hills, where the soil is light and sandy and partially wooded. The rest of the north-eastern portion is good fertile soil, open, with marshes producing good hay. The water supply is good.'

Mr. Ogilvie.

Passed south-westerly towards Neutral Hills.

Continuing description from section $\frac{52}{108}$.

"Thence south-westerly over the same kind of soil about 10 miles to a creek, which appears to me to be Eagle Creek or a branch of it; good fresh water in it, but no current. Thence southerly over the valley of a dry creek, in which is some very good native hay; on, over gravelly ridges and good clayey black loam for about 15 miles; crossed a deep, wide ravine, with strongly alkaline ponds and boulder-covered sides, some shrubs and a few small poplars and good grass. Thence south-westerly, over dark gravelly loam and good grass, no water; a large ravine to right or north-west for about five miles, containing some large alkaline ponds and a few poplar trees; ravine turns away to right, then on, over gravelly ridges and good large loamy clay flats, with excellent grass, and many ponds of fresh water in them, no wood. At about 12 miles it changes to more gravel but without water, and continues so for about 12 miles, to some large ponds strongly alkaline, which I was informed were fresh enough to be used in years of ordinary rainfall. Thence westerly, over gravelly ridges and light flats; then grass for about six miles to a place known as 'Spirit Woods.'"

Surveyor-General Dominion Lands, Rep. 1878—*J S Dennis, jun., p.* 22.

Along the 11th Base line, (Latitude 52° 32′ 13″.) "From the Meridian range 18 and 19 to the 110th Meridian, the country is decidedly more attractive. For the first thirty miles there is a scarcity of wood, but good water abounds."

"From the exceeding richness of its grasses and the special fitness of the kinds produced, I am led to believe that it excells as a grazing country any thing I have seen in Manitoba or the North-West Territories."

$\frac{52}{110}$ Captain Palliser crossed this section about Lat. 52° 35′, passing westward.

Palliser, pp. 85, 86.

For description of country between Nose Creek and Battle River, see section $\frac{52}{109}$.

Battle River, at first crossing, is a stream 48 yards wide, by two to five feet deep, with a very tortuous channel, through a wide valley with steep banks, 150 feet high, with good alluvial flats, and, except towards Elbow, the plain on either hand is also rich. The country around is rich and very suitable for agriculture; fine growth of woods, chiefly poplar, with few spruce and firs.

From Flag Hill, an eminence 400 to 450 feet above plain, extensive view of undulating country, with patches of poplar and small lakes.

Henry A. F. MacLeod.

The northern portion is good fertile soil, with marshes producing hay; the surface is hilly, rolling and open prairie; the water supply is good.

Mr. Ogilvie

Travelled westerly through this section to the "Nose" on the western side, and thence proceeded south.

SPIRIT WOODS.—"Where is plenty of good spring water, poplar wood, and an abundance of wild choke cherries.

"This is the most remarkable place I have seen in the territories, as it appears to the eye to be the top of an extensive ridge of pure sand, and yet, in places, one has only to cut through the sod of the grass which grows on it to find an abundance of good fresh water.

"Thence southerly about 12 miles, over sand and gravel, poor grass, to Sounding Lake, around which there is a good deal of poplar wood; the soil on the east side of the lake is generally sandy; on the south side there is some good soil in the valley of a creek which runs into it, where the grass is good, and some hay could be got; bordering this creek are some very high gravelly knolls.

"From Sounding Lake to the "Nose," about 20 miles in a straight line, the country is very rough; the soil generally gravelly, fair grass, many ponds, most of them alkaline; some fresh springs.

"North and west of the "Nose," the soil for eight or ten miles seems to be fair black gravelly loam; good grass and good fresh water ponds, with frequent patches of poplar."

$\frac{52}{111}$ Captain Palliser crossed westerly through the centre of this section.

Palliser, p. 87.

Second Crossing of Battle River. (Lat. 52° 28′ 25″, and Lon. 111° 29 ′45″.) "Many curious sections of soft sandstone and clay strata were here exposed. In the bed of stream we found pieces of coal, and it was also observed in bed further up the stream."

"The northern exposure of the river valley, as usual, was the wooded side, containing poplar, spruce, fir, ash-leaved maple, and birch," while the other side was almost entirely bare of wood.

From Battle River westward, the country is equally favorable for agriculture as that in section $\frac{52}{110}$, but perhaps a little more irregular; the pasturage was excellent.

Captain Palliser also crossed the south-west corner of this section, on his expedition from Edmonton to the Forks of the Red Deer River and the South Saskatchewan.

Palliser, p. 134-135, and map.

Travelling south-easterly, crossed Eagle Creek, the pasturage continuing good. A few miles south the edge or line of the "woods" was reached; here they were obliged to cut small loads of wood for use on the prairie course to the south.

Having reached the edge of the woods, Capt. Pelliser defines, at page 89 of his journal, a line of demarkation between the Ancient Forest Lands and the True Prairie District, as follows:

"Let us imagine a line drawn from 60 miles south of Fort Carlton, which is on the verge of the Great Prairies, to the Wigwatinon, and thence produced to the site of the 'Old Bow Fort.' This line marks the boundary of two natural divisions of the country, viz.: The Ancient Forest Lands and the True Prairie District. To the north of line generally there is timber, a good soil for agricultural purposes up to 54° north latitude, and superior pasturage; to the south there is no timber, the soil is sandy, with little or no admixture of earthy matter, and the pasture is inferior. Exceptions of course may be found, as, for example, in the neighborhood of swamps and gullies, where the soil and pasturage are better."

After leaving the "Edge of Woods," entered upon an arid country; hard white clay soil, with no vegetation; to the west there is scanty but nutritious grass. Approaching the Squirrel Hills, the country becomes "rolling and broken, the swells often rising 200 feet above the general level."

$\frac{52}{112}$ Capt. Palliser crossed this section to the south of Buffalo Lake.

Palliser, p. 87.

The soil continued rich and the vegetation luxuriant, "and we are of opinion that few places in the Saskatchewan could be found that offer greater facilities to settlers." No fine timber, it having all been destroyed by fire. There were several swamps and small lakes with brackish water; the water of Sullivan's Lake was, however, clear, and not in the least saline.

In the valley of Tail Creek poplar was the principal wood.

Col. MacLeod

Traversed the western side of this section, and describes that portion south of Red Deer River as a prairie country of fair soil and good pasture. That to the north, a fine fertile soil and sparsely timbered with poplar, in some places of good size; had seen coal at Tail Creek on Red Deer River.

52/113 Captain Palliser crossed this south-westerly, towards the forks of Medicine and Red Deer Rivers.

Palliser, pp. 88, 89.

Dead Man's Creek.—Spruce in fair abundance, and luxuriant vegetation in low valley of creek.

Found coal-beds in this creek, which were on fire, and far along "the banks of Red Deer River, where coal appeared, the spontaneous fire was in activity."

Passing through eight miles of irregular and wooded country, descended into Red Deer Valley, 200 feet deep. River 130 yards wide.

"On both banks the coal strata are seen, in many places 15 feet thick, but the quality of the coal is not superior to that found at Edmonton; it burns without flame, but keeps ignited for considerable time and gives out good heat, leaving ashes similar to that of wood."

This neighborhood is generally described as a broken country; rich soil and pasture; partially wooded, fair growth of wood in valley, which increases towards the source. Red Deer River is reported navigable from this point down to junction with the South branch of Saskatchewan, which is also free from obstacles thence to North branch of Saskatchewan.

Dr. Hector, of the Palliser expedition, travelled during winter from Bear's Hill, situated in the north-east corner of this section, south-westerly to forks of Medicine and Red Deer Rivers.

Palliser, p. 119.

Bear Hill is a low-wooded eminence. To the south of it crossed a plain for about nine miles, then through poplar and willow thickets, hilly and swampy, along the cart trail. Crossing Battle River, passed through a range of low hills, and found very little timber in this part of the country. "This is not a true plain country, as it is covered with a small growth of willows and alder. Even at this season much of this district looks inviting." In the south-western part of this section the country is described as a rich plain.

Mr. Selwyn crossed the north-western part of this section during his journey from Edmonton to Rocky Mountain House.

Selwyn Geol. Rep., 1873-74, *p* 39.

From Bear's Hill to Battle River, no change in character of country, which he previously describes as of "rich black soil, swampy lakes, open, richly-grassed prairies, patches of copse wood, with spruce and poplar," a drift covered surface being the prevailing feature.

Col. MacLeod

Passed through the southern part of this section, and describes it as a very fine, fertile soil, with some muskeags and partially wooded with clumps of small trees.

52
114 Captain Palliser crossed the south-eastern part of this section

Palliser, *pp*. 88, 89.

Crossing of Red Deer River to Caché Hill, near forks of Medicine and Red Deer Rivers, very fine land, rich plain, great variety of plants, but timber destroyed by fire.

From Nick Hill is seen a low, flat prairie, extending far away to north and west; the wooded border of Red Deer River is the only line of vegetation to relieve its barren surface. At the junction of Medicine and Red Deer Rivers there is plenty of fine timber, which could be rafted down the Red Deer River.

The north-western portion of this section is described on Palliser's map as a "thick wood and swampy country," and the north-east as "successive ridges running north-west, having their west slopes clothed with poplar, and their east with pine."

Mr. Selwyn crossed this section south-westerly, on the trail from Edmonton to Rocky Mountain House.

Selwyn Geol. Rep., *pp*. 39, 40.

Blindman's Creek.—Here rocks are well exposed in cliffs 50 feet high. Soft, friable sandstone (brown), one to ten feet thick, with layers of thin-bedded sandy shales, and near top of section 14 inches of hard flinty-looking rock. Near the base, resting on sandstone, a thin layer of lignite.

From Blindman's Creek to Rocky Mountain House, 37½ miles.—At 13 miles the road, the worst travelled over since leaving Fort Garry, enters a flat and thickly-timbered country, and for ten miles skirts and crosses swampy meadows, muskeags and belts of thick spruce forests. It then rises by gentle ascents, passing through thick poplar and dwarf birch woods to summit of ridge, "immediately beneath which, nearly 300 feet, and stretching away to the Westward, lies the valley of the Saskatchewan. The view up of the valley is bounded by the serrated ridges and snow-clad peaks of the Rocky Mountains." Following along the brink of cliffs, in a southerly direction, a gradual descent of two or three miles is made into the valley of the Clearwater River, a large tributary which joins the Saskatchewan about a mile below the Post. The road crosses the Clearwater one-quarter mile above junction, and passing over the alluvial flats in the angle between the two rivers, strikes the Saskatchewan opposite the Fort.

Thus the journey of 1,055 miles was completed. Mr. Selwyn returned East by water down the Saskatchewan.

The general character of country surrounding Rocky Mountain House is of rolling, irregular surface, with dark green pine forest.

52
115 Dr. Hector, of the Palliser expedition, crossed this section from the Rocky Mountains along the North Saskatchewan to Rocky Mountain House.

Palliser, *pp*. 113, 114,

Describes it as a broken, wooded country, pines on the ridges, with large spruce and larch, and swamps in the low grounds.

ROCKY MOUNTAIN HOUSE is on the Eastern side of this section, and stands 3,195 feet above the sea.

$\frac{52}{116}$ Dr. Hector travelled up the North branch of the Saskatchawan through this section.

Palliser, p. 113.

"The river, after leaving the mountains, turns a good deal to the north, and quite suddenly the country becomes comparatively level on either hand; still, however, at a little distance back, forming hills 800 to 1,000 feet above the river, the outer or Brazeau's range formed a line of lower mountains 15 or 20 miles to the east, and the space between forms a wide valley, the irregularities of which are nearly obliterated by the magnificient developement of the shingle terraces."

"The country" in this great valley "is very beautiful; the timber is a good deal cleared away by fire, but still large bluffs remain, while in the openings on the high grounds there is rich pasture and poplar and willow breaks."

This is a famous place for the mountain sheep.

$\frac{52}{117}$ This section is in the Rocky Mountains.

Henry A. F. MacLeod.

"The valley of the Maligne River is entirely in the Rocky Mountains. It is narrow and deep, with steep sides, precipitous in places. The rock is covered in places with sand, gravel, clay and moss. There is a fair growth of spruce and poplar in the lower parts of the valley, which disappear near the source of the river. The herbage is very scanty. Water supply abundant."

$\frac{52}{118}$ *Henry A. F. MacLeod.*

"The valley of the Myette, in the north-east corner, is entirely in the Rocky Mountains. There is generally a flat in the bottom of the valley, varying from half a mile to a mile wide; the soil is light and sandy, with muskegs in places; the sides of the valley are steep and rocky; it is heavily timbered with spruce and poplar, except a small open prairie about three miles east of the summit."

The boundary of British Columbia passes through this section.

FROM THE 100TH TO THE 116TH MERIDIAN, AND BETWEEN THE 51ST AND 52ND PARALLELS OF LATITUDE.

$\frac{51}{100}$ The north-eastern part of this Section borders on Lake Winnepegosis. The Duck Mountain occupies a large portion of its western half, and Riding Mountain enters it from the south. See section $\frac{50}{100}$ for Mr. Hind's description of Duck and Riding Mountains.

Henry A. F. MacLeod.

"The north-eastern portion, along the line of the C.P.Ry., consists generally of good fertile soil, heavily wooded, with occasionally good spruce, and intersected with marshes producing good hay. The surface of the ground is flat, and the supply of fresh water is abundant."

Cunningham, C. P. Ry. Rep., 1877, *pp.* 186-187.

Describes the N.E. portion of this section as a fine fertile soil, evidenced by "the luxuriant and varied undergrowth of the forests, together with the various kinds of grasses produced." "A plentiful growth of fine timber, spruce, tamarac, poplar and birch," among which were "many white spruce 2 feet 6 inches in diameter, and of thoroughly sound quality."

Frank Moberly, Engineer in charge of Expedition, Pacific Railway Report, 1872, *p.*56.

From the level of Fort Pelly there is no difficulty in descending by the valley of Swan River, to the low ground east of the Duck Mountains; from Swan River, the country lying north of Duck and Riding Mountains, was found on examination to be nearly level, thickly wooded with spruce, poplar, and some maple, a few small lakes and marshes were also found; soil sandy loam and admirably fitted for farming."

"Generally speaking the country extending from about Fort Pelly by Swan River, and between the Riding Mountains and Lake Manitoba to Prairie Portage near Fort Garry, is for the most part well wooded and the soil of excellent quality."

$\frac{51}{101}$ The Swan River flows through the northern part of this Section, and the Assiniboine enters it from the west at Fort Pelly, flowing through it a little to the east of south.

Hind's A. & S. Exp., Vol. 1, *pp.* 435-436.

Mr. Dawson travelled from Fort Pelly southerly along the flank of Duck Mountain, "through a country admirably adapted for farming purposes. With the exception of narrow ridges, it possesses a rich black fertile mould, supporting very luxuriant herbage, and on the mountain an ample supply of timber, consisting chiefly of aspen of large dimensions.

"The Riding and Duck Mountains consist of a succession of slopes and terraces on their south-western side, the ascent being almost imperceptible to the thick impenetrable forest which covers the highest plateau."

Col. MacLeod.

Travelled through this Section on the west of the Assineboine to Fort Pelly. The southern portion he describes as a poor soil partially wooded; proceeding north it becomes a fair soil with clumps of trees.

Henry A. F. MacLeod.

"The south-western portion is poor, light soil, partially wooded; the central and western portion fair and partially wooded; above Livingstone the soil is poor and covered with boulders, lightly wooded.

In the valley of Swan River there is some good fertile soil partially wooded, with open marshes producing good hay. The valley of the Assineboine is wide and deep at the south, becoming smaller as it approaches Fort Pelly; the surface is hilly and undulating.

Frank Moberly, Pac. Ry. Rep., 1872.

See his description in Section $\frac{51}{100}$.

$\frac{51}{102}$ *Hind's A. and S Exp., Vol. 1, p. 431 and maps.*

Proceeding from south-west towards Fort Pelly, describes south west portion as an undulating open prairie, numerous marshes and ponds, and good land in the valley. To the north of Little White Sand River a gravelly loam, with groves of poplar and underwood of cherries, roses, &c.

Col. MacLeod.

Crossed the northern part from Fort Pelly towards Touchwood Hills, and describes it as a fair soil, partially wooded, with some swamps producing good hay; and on the west side, on the trail, a fine rich soil, heavily wooded, with pools or swamps producing good hay.

Henry A. F. MacLeod.

"The north-eastern part is fair soil, improving to the west to good fertile land, heavily wooded to the north-east with spruce and poplar, diminishing in size and quantity to the south. Near White Sand River, where there is no spruce the surface is hilly and undulating, with intervening marshes producing good hay. The valleys are small and narrow and the supply of fresh water abundant."

Surveyor-General Dom. Lands' Rep., 1876—*A. L. Russell, D. L. S., pp.* 18, 19.

THE 2ND PRINCIPAL MERIDIAN, lon. 102°. From lat. 51° for about 32 miles the country is better than that immediately south, and the next 5 miles to the end of the survey "is excellent sandy loam well wooded and watered."

"Here the production of the meridian ceased. A rapid trip to Fort Pelly (about 16 miles north), however, enables me to state that all the way to that place the soil is good, and wood and water comparatively well supplied. In the vicinity of Fort Pelly and northward the land is lighter; water is, however, plentiful, and poplar of a large size as well as spruce are here first met with. The approach to Swan River Barracks near Livingstone (11 miles north of Fort Pelly) presents a very forlorn appearance, being thickly covered with granite boulders of various sizes."

"At Fort Pelly the soil is almost pure sand, potatoes, corn and some other cereals grow to a good size, when they escape destruction by grasshoppers and summer frosts."

EIGHTH BASE LINE WESTWARD.

This Base line in latitude 51° 28′ 34″ was produced 49 miles westward from longitude 102°. "We find that throughout the whole of this distance poplar bush, from 2 to 12 inches in diameter, and willows predominate. The land is good and water throughout abundant, and in places more than desirable, as the numerous lakelets, ponds and connecting marshes attest. These characteristics are doubtless due to the retention of the surface water by clayey subsoils. A noticeable fact in connection with this country is that both in running waters, and in surface ponds having no apparent outlet, the water is invariably hard." At the 41st mile a gradual ascent of the Beaver Hills is commenced.

51/103 *Selwyn Geol. Rep.*, 1873-74, *pp.* 26, 27.

Mr. Selwyn travelled north-westerly through this section from the S.E. corner towards the Touchwood Hills.

Pheasant Hills to left appeared to be thickly wooded.

No marked change in the country, but lakes and lake basins more abundant, and water in many of them slighly brackish. The lakes are gradually drying up. Soil light, vegetable mould on whitish colored silt, passing down into well rounded gravel, and the general luxuriance of grass indicates a fertile soil.

Approaching Touchwood Hills, the country in parts is very picturesque, undulating and sometimes hilly, patches of woodland, with lakes and pools. Poplar, larger than seen since Fort Ellice, with undergrowth of willow. Some lakes quite salt, others only slightly brackish, but quite drinkable.

Hind A. and S., Exp., Vol. 1, *pp.* 421, 422.

Mr. Hind crossed the southern portion of this section, travelling easterly from Long or Last Mountain Lake.

On approaching File Hill, "a more humid tract begins, dotted with marshes and ponds." "The soil improves in character and the country becomes very picturesque and attractive."

"The view from the summit of a mound revealed a rolling, treeless prairie, stretching on all sides and bounded only by the horizon. The wooded range of Pheasant Mountain appeared low in the south-west." "Numerous lakes, ponds and marshes, covered with wild fowl, are visible in every direction. The soil in low situations is good, supporting long grass, which afforded fine pasturage for our cattle. The ridges and mounds are gravelly, and a few boulders of the unfossiliferous rocks are seen here and there."

Henry A. F. MacLeod:

"The south-east portion consists of an open undulating plain, fair soil, and good pasturage. In the neighbourhood of the Touchwood Hills the soil is good and fertile, with marshes producing good hay, and partially wooded.

On the Touchwood Hills, which are not high, the soil is light and gravelly, partially wooded, and affording good pasturage.

To the north-east the soil is good and fertile, and more to the west poor and stony. To the north-west good fertile soil.

The northern portion is thickly wooded, decreasing in quantity and size to the west, where the country is open. The supply of fresh water in the south is limited, but to the north there is a larger quantity."

Surveyor-General Dominion Lands' Report, 1876—*A. J. Russell, p.* 18.

The 8th Base line, see section $\frac{51}{102}$, is continued into this section for about 6 miles "From the 41st to the 49th mile the line gradually ascends the north-east slope of the Beaver Hills, where the barometer indicated an approximate altitude of 1,800 feet above the sea." This Base terminated at the 49th mile from longitude 102°, and from that point a line was surveyed north for a distance of about 24 miles to the 9th Base.

"On turning to north at the 49th mile, the line shortly emerges from the thickly-wooded hillside to a more open country, gradually descending all the way to the White Sand River, where a stretch of almost open prairie of about 13 miles is crossed, containing very little timber of useful size.

"The soil, although sandy, is still of good quality, and possibly of more value than rich moist lands, which are more subjected to summer frost. The first frost noticed by us was on the 31st of August, at the "Crooked Lakes," where a film of ice of the thickness of paper formed round the marshy shore."

The ninth Base line, latitude 51° 49′ 47″, commencing six miles west of longitude 103° and running westward to Big Quill Lake.

"From about five miles south of this Base, and westward along the same for 14 miles, the line ran through alternate openings and poplar bush, crossing several lakelets and coming to an end at the eastern shore of the Fishing Lake, several miles in length.

"The soil throughout this section is good sandy loam, and much of the timber of useful dimensions. On the tenth mile we crossed a well defined cart trail leading north-westward to Quill Lake."

Surveyor-General Dominion Lands' Report, 1877—*A. L. Russell, p.* 12.

The ninth Base continued westward from Fishing Lake. "The line here passed through a section of country well supplied with both wood and water, having a soil of sandy loam of fair quality, lying between the Quill Lakes and Touchwood Hills. The streams running into the Quill Lakes are all fresh water, whereas the lakes themselves are strongly alkaline. Shallow depressions, with no visible outlet noticed by us. Big and Little Quill Lakes are apparently on the same level, being connected with one another by a narrow channel."

$\frac{51}{104}$ *Sandford Fleming Pac. Ry. Rep.*, 1874, *p.* 37.

"About 110 miles to the northwest of Fort Ellice the Touchwood Hills are met. These are mere undulating eminences, partly wooded, with remarkably good soil, and apparently well adapted for settlement; they gradually descend on the western side. Some difficulty was found in this neighbourhood in obtaining water, that which we could find was often brackish and scarcely drinkable, and seemed to be only the remaining deposit of last winter's snow."

"Scarcely any rivers are met; it is observable, however, that several running streams are found farther north.

"The route on which we were travelling explains this feature of physical geography, for we were on the water-shed between the Assiniboine and the South Saskatchewan. We found that this part of the route is generally without timber, but it contains spots where slight wooded knolls are met. Apparently level, in reality there is a considerable ascent as the country is travelled westward."

Mr. Selwyn passed through north-westerly, crossing the Touchwood Hills.

Selwyn Geol. Rep., 1873-74, *pp*. 27, 28, 29.

TOUCHWOOD HILLS.

Reached the base of Touchwood Hills, and diverged to left to Little Touchwood Hill mission, 15 miles south-west. Passed through hilly country covered with thick copse wood, and numerous lakes. Fort surrounded with extensive woods, large white birch and poplar, 2 feet in diameter, suitable for joists, flooring, boards, &c. Soil, rich light brown loam, would doubtless produce good crops.

The plateau of Touchwood Hills is an undulating country, with a series of drift hills, intercepted with lakes and aspen groves, soil of best quality and herbage luxuriant. Breadth of this beautiful plateau is 4 miles, and about 500 feet above the salt prairie to the west. Heart Hill is 700 feet above plain.

No timber visible west of Range, except small aspen and burnt willow.

GREAT SALT PLAIN.

The great salt plain stretches away to the westward, utterly void of timber; at 12½ miles from the old Hudson Bay Post, came to first drinkable water on plain.

Innumerable circular and oval pits occur amongst hills and on plains, some contain water, but most were dried up at this season, (August), and others larger contain saline and brackish water lakes.

"This plateau forms the watershed between the Qu'Appelle, to S.-W., and Saskatchewan and Assineboine to N.E." The small proportion of surface drainage, rapid evaporation and considerable percolation through sandy drifts, is sufficient to account for saline character of lakes.

Many of them are three, four and five miles long, by one and two miles broad, occurring frequently in chains, in which case the highest contains quite fresh or only slightly brackish water, while the lowest is intensely salt and bitter.

"From 12½ miles from Touchwood Hill Post, made 27 miles to-day passing all day over great salt plains and treeless prairie."

In depressions of last six miles dwarfed poplar and willow bush five feet high, soil blackish loam, rather sandy on sub-soil of white-looking gravel. Limestone and gneiss blocks thickly scattered over surface.

Made 36 miles; wood and water scarce and far apart; country more undulating, most part open prairie.

Mr. Robert Bell, of the Geological Survey,

Travelled from the Qu'Appelle Mission in section $\frac{60}{104}$ to the Touchwood Hills.

Bell Geol. Rep., 1873-74, *pp.* 81, 82.

Fort Qu'Appelle to Touchwood Hills, 48 miles due north to mission at Little Touchwood Hills.

From the bank on the north side of the valley at Fort Qu'Appelle the surface is very uneven up to the mission.

The surface soil consists almost every where of rich black loam, with gravelly clay sub soil; clumps of trees and bushes scattered everywhere. In approaching Little Touchwood Hills numerous lakes of fresh water were seen.

Clayey soil prevails on the Little Touchwood Hills, which are covered by a growth of poplar woods, trees in some parts being large and valuable for building. The main road between Fort Ellice and Carlton is 12 miles north-east from mission, and track leading to it lies mostly in woods and passes several small lakes.

Henry A. F. MacLeod.

"In the neighborhood of Touchwood Hills the soil is good and fertile, with marshes producing good hay, and partially wooded. On the Touchwood Hills, which do not rise very high above the plains, the soil is light and gravelly, giving good pasturage and partially wooded. To the north-west there is an open saline plain with poor, light soil and fair pasturage, extending some five miles to the north of the trail. There is a fair supply of water about the Touchwood Hills, but on the plains to the north west fresh water is scarce.

Surveyor-General Dominion Lands' Report, 1877—*A. L. Russell*, *pp.* 12, 13, 15.

The ninth Base line runs for about 11 miles in this Section as far as Big Quill Lake. *See* Section $\frac{51}{108}$.

Meridian between Ranges 16 and 17 W., commencing at the ninth Base, and running north.—

"The first six miles are on the sandy alkaline strips between Big and Little Quill Lakes. Some fair sized timber is found here, but the soil is poor, and continues so through a more open country until within three miles of the C. P. R. line."

On travelled road from Touchwood H. B. Post, at about longitude 104° north-westerly towards Carlton,—

"The new stores now building for the H. B. Co. on the main road at Touchwood Hills, will be more convenient for the travelling public than those now occupied, which stand about a mile from the road.

The Touchwood Hills terminate about 28 miles west of this Post, and for 24 miles of this distance the road passes through a very hilly country heavily timbered and dotted with small ponds. The summit of the Big Touchwood Hills is about 15 miles from the H. B. Co.'s store.

The soil near the road is generally sandy and gravelly. I passed here in company with several Manitoba farmers, who were of opinion that but little land fit for farming could be seen from the trail; much good land I am informed nevertheless exists in various places throughout these hills.

After leaving the Touchwood Hills the road enters on a long, desolate alkaline plain, with no wood, and only a couple of ponds where water can be obtained."

$\frac{51}{105}$ Mr. Hind crossed the north-east part of this Section, travelling towards the Touchwood Hills.

Hind A. and S. Exp., Vol. 1, p. 412.

Referring to this part of the country,—"In the prairie valleys, and often when surrounded by conical hills, the ponds are fringed with boulders, while water marks show that in the spring a large area is flooded. This is particularly the case at the foot of the Touchwood Hills." "The lakes and marshes all contain salt or brackish water."

Henry A. F. MacLeod.

"At the north-east corner the soil is light and gravelly, with marshes producing good hay. The country undulating and rolling, partially wooded; fresh water in small quantities."

Long or Last Mountain Lake extends into the southern portion of this Section, and the country there probably is similar to the northern part of the Section $\frac{50}{105}$.
See extract from Hind, Vol. 1, p. 421, in section $\frac{50}{105}$.

$\frac{51}{106}$ The South Saskatchewan crosses the north-west corner of the Section, where is situated the "Moose Woods."

Hind A. and S. Exp., Vol. 1, *p.* 387.

The region called the Moose Woods "is a dilatation of the Saskatchewan, flowing through an extensive flat six miles in breadth, cut into numerous islands. This flat is bounded by sand-hills, some of which are nothing more than shifting dunes. The woods are in patches, and in the low land consist of balsam, poplar, white wood and aspen; small aspen clumps cover the hills; but no timber of importance has yet been seen." The river flows through a broad alluvial flat for 25 miles; its water very turbid like that of the Mississippi.
Mr. Hind also touched on the Southern part of this section during his exploration from the Qu'Appelle Lake to the Elbow of the South Saskatchewan—(see section $\frac{50}{106}$), but does not appear to have penetrated the interior, which is marked on his map, "Barren Treeless Prairie."

$\frac{51}{107}$ The South Saskatchewan runs northerly through this section. Mr. Hind travelled down this river from the Elbow.

Hind A. & S. Exp., Vol. 1, *pp.* 366, 380 *and* 389.

South Saskatchewan from Elbow to junction with North Saskatchewan, or "Grand Forks."—
The river from the Elbow, fully 600 miles from the point where the main river disembogues into Lake Winnipeg, is half a mile broad, and with a swift current of 2 to 2½ miles an hour, not more than 350 miles from the Rocky Mountains, where it takes its rise.
The banks are 60 feet above the water, composed of cretaceous sandstone covered with 7 feet of drift; for many miles this upper cretaceous rock continues to form the river bank. "The banks of the river slope gently from the prairie on the south-west side to an altitude of about 250 feet above it. They then assume the form of steep declivities."

"On the north-west side the sandstone cliff rises abruptly from the river to a height varying from 30 to 60 feet, when it meets the foot of an undulating slope which extends to the prairie level.

"Trees, consisting chiefly of aspen and mesaskatomina, are found in patches on both sides.

"The river continues for many miles about 700 yards broad, with numerous sand-bars, and low alluvial islands. The drift above the sandstone is gravelly, and many small sand-dunes occur on the hill bank sloping into the prairie, into which they have progressed to a considerable distance.

"A treeless prairie, boundless and green, except where the patches of drifting sand occur, is visible on either hand from the top of the bank.

"At about forty-five miles from the Qu'Appelle valley or the Elbow, the river banks and the whole country are much lower, the banks being not more than 100 feet high, becoming lower as we proceed north; they are treeless areas, and so is the prairie on either side, with a few detached exceptions. The river is half a mile broad, depth 9 to 10 feet, with current 2½ miles an hour.

"About 60 miles from the Elbow small forests of aspen begin to show themselves on the banks, after passing through a low country, which is an expansion of the river valley." The ash-leaved maple also begins to appear, but the "woods" are not continuous, and the prairie on either side remains bare.

"Approaching Moose Woods we passed for several hours between a series of low alluvial islands from 10 to 12 feet above the water. They sustain some fine elm, balsam, poplar, ash, ash-leaved maple, and a vast profusion of the mesaskatomina. The river valley is bounded by low hills leading to the prairie plateau 4 to 8 miles back.

"The country here furnishes an excellent district for the establishment of a settlement. The spot where we encamped is an extensive open undulating meadow, with long rich grass," 10 feet above the water, but does not appear to be flooded in the spring.

Captain Palliser travelled by land from south to north through this Section, west of the South Saskatchewan.

Palliser, pp. 56, 57, 58.

Elbow to Red Deer Lakes.—On the north side of the river occur hills of drift, plentifully strewn with boulders instead of the loose sand which prevailed on the south bank; some fair clumps of wood, with good grass, varying from one-half to two miles in extent; several deep gullies present rich and grassy slopes.

All on the upper plain is, however, as bare and arid as that on the other side of the Saskatchewan. "We then passed through some swamps with long grass, but little timber of any size."

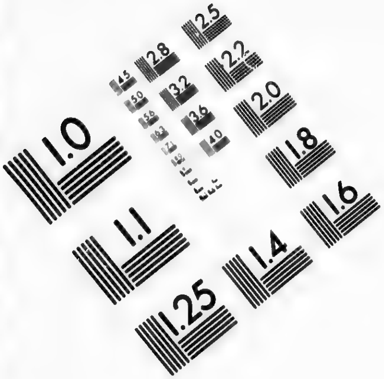
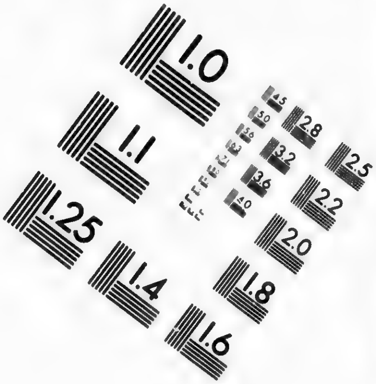
The continuation of the "Côteau des Prairies," constantly in sight, extending in a northerly direction since leaving the river.

THE RED DEER LAKES are six to eight in number, from one-half to two and a-half miles wide, in valley thickly strewed with boulders.

Northern side, as usual, without wood, while southern slopes support thick growth of poplar and willow.

This valley crosses the Saskatchewan 12 miles below Elbow, and is said to join the Qu'Appelle by the Last Mountain lake, with scarcely any obstruction.

A canal between Assiniboine and Saskatchewan might be feasible at some future day.

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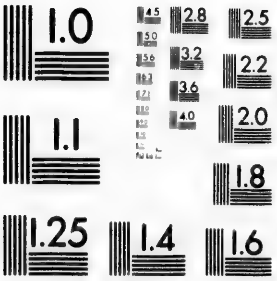

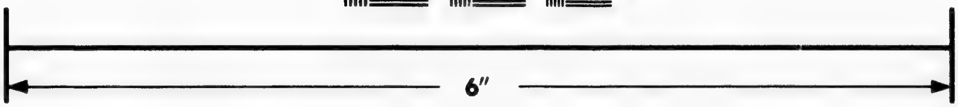

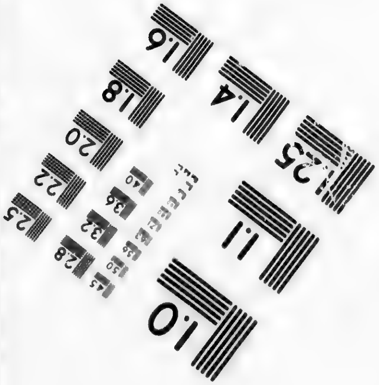
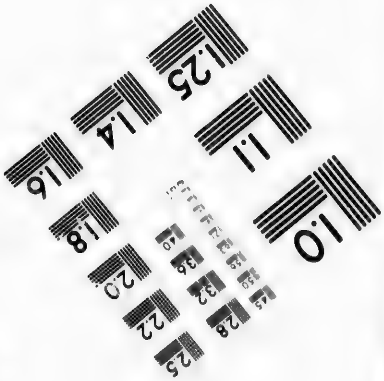

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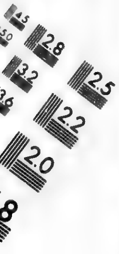
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From Red Deer Lakes to point opposite Moose Woods.—Ascending to the prairie, passed many salt lakes, fringed round the edges with thick incrustation of salt, showing the rapid evaporation in these arid regions. The country is of irregular sandy ground, covered with low coppice, and here and there rising into hills clad with poplar.

$\frac{51}{108}$ See section $\frac{51}{109}$ for Col. MacLeod's and Capt. Clark's description.

$\frac{51}{109}$ *Col. Macleod.*

Has made three journeys over the Great Plains from "Cypress Hills crossing the South Saskatchewan, where it receives the waters of the Red Deer, to Battleford," and states:—

"The whole country is a high rolling prairie with gravelly ridges running in every direction. Grass of varying quality is to be found everywhere, and water varying with the season.

"There is not a tree or shrub to be seen except in the river 'bottoms,' where groves of good sized cottonwood are to be found. I know a person named Fitzpatrick who took a drove of cattle from Fort McLeod, where they had wintered, straight across the country to Battleford; he told me he experienced no difficulty, either from want of grass or water, and his animals arrived in good condition.

"Messrs. Baker & Co., have twice driven cattle from Fort Shaw, Montana, to Battleford and neighbourhood, crossing at the mouth of Red Deer River, and travelling north-westerly to Neutral Hills, thence north-easterly to Battleford; and I was informed by their agent that they experienced no difficulty north of the Saskatchewan. It is through this tract of country that the large herds of buffalo range in the summer, very good evidence that there must be quantities of grass."

Capt. C. Dalrymple Clark, of the Mounted Police, also states:—

"I have crossed the Great Plains marching from Battleford to Cypress Hills, crossing the Saskatchewan at the mouth of the Red Deer River. It was during the month of October, and the grass everywhere was good. We had with us about one hundred horses and twenty head of cattle, and no difficulty was experienced with regard to either grass or water. Water was found at convenient distances, and only once was a dry camp made, and then it was discovered next morning that water was at hand. I should call the Great Plains a fine grazing country; in many places the traveller comes across the buffalo or bunch grass. This grass is most nutritious, and always preferred to other grass by both horses and cattle.

"Ridges of gravel are come across, and from about 15 miles south of Battleford not a tree or shrub is to be seen till the river is reached, where cotton wood of fair size is abundant.

"The approaches to the river are difficult to find, and when found, very often impassable for waggons, they are formed by immense coulées which run out into the plain sometimes for miles."

$\frac{51}{110}$ See section $\frac{51}{109}$ for Col. MacLeod's and Capt. Clark's description.

Mr. Ogilvie.

Mr. Ogilvie travelled south from "the Nose," through the western portion of this section, to Red Deer River.

"From the "Nose" due south for about 20 miles, good grass, frequent ponds of good water, some hay meadows; then gravelly ridges and light flats, with some alkaline and fresh ponds; some very high knolls for about 30 miles, when we come to low land near a creek; some pools of slightly alkaline water, but no current; the flats strongly impregnated with alkali, in some places it lies on the ground an inch or more deep, and is whirled about by the wind like snow; thence over gravelly ridges and generally light soil, but good grass, to Red Deer River. In all this distance there is no wood."

Fitzpatrick, referred to in Col. Macleod's description, section $\frac{51}{109}$, crossed the north-west portion of this section.

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III

Captain Palliser entered this section on the north and travelled southerly to the south-east corner.

Palliser, pp. 135-136.

Crossing the Squirrel Hills, travelled over a wide arid flat plain, interpersed with mud swamps and salt lakes and scanty growth of grass, and came in sight of very marked range of hills with an abrupt escarpment to the west, near which found large stream flowing north-east.

HAND HILLS are a plateau with rugged and steep side to the north-west and south; to the east it slopes gradually. The Rocky Mountains can be seen from these hills. The plain all round the base of these hills is bare and arid, but the high level of the hills bear a very fair and almost rich pasture, being 680 feet higher than the plain, and 3,400 feet above sea; also contains lakes of pure fresh water, and gullies with small growth of poplar.

Red Deer River sweeps round the base of these hills through a level plain, at a distance of from seven to ten miles; its immediate valley is a depression, varying from 240 to 300 feet in depth; plains extend in all directions where there is no grass and [illegible] fresh water; even in the river valley there is no grass and very little wood.

Dr. Hector describes the Red Deer River in this neighborhood as 130 feet wide, and flowing through a valley averaging 1,200 yards across.

Coal and ironstone, silicified wood and lignite, with gypsum and fresh water shells found in strata; in the valley only a few bluffs of poplar, the vegetation being principally sage and cactus, the latter in flower; on the plain to west of hills, and between river, the pasture is scanty.

At Bull Pond Creek there was good grass and fine water, with a few willows. Sections of sandstone here seen.

Berry Creek is the largest river valley of the tributaries to Red Deer River which we have seen, but its waters are now but a chain of disconnected pools, thence towards Red Deer River, wretched soil everywhere, horses miserably off for grass.

Plain to the north of river very broken, came to valley from north 5 or 6 miles in width, and full of buffalo. There were many acres of grassy plain affording fine pasture in the valley.

Fitzpatrick, referred to in Col. MacLeod's description $\frac{51}{109}$, passed through this section with drove of cattle from Fort MacLeod to Battleford; found grass and water everywhere.

$\frac{51}{112}$ *Col. MacLeod.*

Touched the north west corner of this section on his journey "from Fort MacLeod to Red Deer River at a point where Tail Creek empties into it;" he describes the country as a prairie of fair soil, with pasture.

Capt. Crozier of the Mounted Police.

Travelled along southern boundary. See sec. $\frac{50}{112}$

$\frac{51}{113}$ Capt. Palliser travelled southerly from Caché Camp through the western portion of this section, passing Slaughter Camp to Lake Oscar.

Palliser pp. 90, 91.

The country passed over after leaving Caché Camp is poor pasturage, the soil sandy, with a proportion of white earth, "then a few small lakes and stony soil, and small supply of wood. At about midway of the section a rolling prairie broken by low ridges and outcrops of sandstone, pretty good pasturage;" and nearing Slaughter Camp passed over a rolling prairie with small swampy lakes; thence south over an arid plain, passing a lake called Oscar on the map about lat. 51°, two miles long, and more than a quarter wide; found its waers, salt, and camped a few miles south without either wood or water.

Col. MacLeod.

Traversed this section through its eastern portion, and describes it as prairie of fair soil, with pasture.

$\frac{51}{114}$ Dr. Hector, of the Palliser Expedition, crossed through this section in about lat. 51° 20′, from Slaughter Camp to old Bow Fort.

Palliser, p. 98.

Leaving Slaughter Camp, "the prairie's surface rises into undulations, which increase in decision and altitude till at length they form a low broken range of hills." On the plateau are groups of large granite boulders; then poplar and willow begin, being the first wood seen since leaving Caché Creek Camp. Continued over a broken rolling country. "There is a very marked increase in the variety and luxuriance of the flowering plants, and the pasture is abundant and well mixed."

"We then crossed a magnificent plateau traversed by rocky gullies, and glowing with a rich profusion of brightly colored flowering plants."

Then crossed Deadman's Creek, and travelled along the valley of the Bow River, until the site of Old Bow Fort was reached.

Dr. Hector also explored, in the winter of 1858, from the "Forks" up the Red Deer River, thence southerly to Deadman's River and returned north to Caché Hill.

Palliser, pp. 120–122 and 146.

He describes the country to the west as becoming mountainous, densely wooded with good timber, comprising fine pine, also much good pasture in the valleys.

Dr. Hector also passed over the S. W. angle of this section, travelling north-westerly "reach Tent Creek, which flows to the north, the banks of which were composed of the same dark shales with ironstone nodules, that were seen on the North Saskatchewan. The country now became very broken, and we had to cross several lofty ridges; after 13 miles we reached White Earth Lake, latitude 51°, 8'; we then struck to the north and making a rapid descent for about 800 feet, struck the Bow River, after crossing which, by following up the left bank for several miles, we reached the old Bow Fort."

Col. MacLeod.

Describes the country in the southern portion of this section as a fine fertile soil, heavily wooded with good timber.

51/115 Old Bow Fort is situated in the south-eastern corner of this section on the Bow River.

Palliser, pp. 98-93.

Dr. Hector, on his journey in 1858, explored thence, through the mountains *vid* Castle Mountain and Mount Murchison to the North Saskatchewan, and thence to Rocky Mountain House.

The Old Bow Fort "is situated in latitude 51° 9', longitude (by means of two sets of lunar observations) 115°, 4', 22", and its elevation above the level of the sea (by boiling point thermemoter) 3,963 feet." "The scenery around is mild and beautiful. Its site is at the base of the Rocky Mountains which tower above it to the height of 3,000 or 4,000 feet, the white summits of which, from a sprinkling of snow that had recently fallen, formed a pretty contrast with the dense sombre forests at their feet. The Bow River flows by in all the wildness of mountain character, foaming at intervals over ledges of rock in its valley, and then rushing onwards between high banks, clad with luxuriant vegetation."

FROM THE 100TH TO THE 115TH MERIDIAN, AND BETWEEN THE 50TH AND 51ST PARALLELS OF LATITUDE.

50/100 Riding Mountain occupies the north-eastern portion of this section; the Little Saskatchewan crosses its south-eastern angle, and Bird Tail Creek flows through the western part.

Selwyn's Geol. Rep., 1873-74, *pp.* 24-25.

Mr. Selwyn travelled westerly through the southern portion of this section. He describes the country between the Little Saskatchewan and Shoal Lake as a light soil, but black, and well suited for cultivation. Blocks and boulders of gneiss and limestone are very abundant on the surface of the plain.

Shoal Lake "is a fine sheet of fresh water, several miles in length and about half a mile wide." "Around the lake the soil is light, sandy and gravelly, but improves again at a short distance." Thence to Bird's Tail Creek, "the soil is certainly poor, the grass coarse and wiry looking, and especially on the ridges where beneath a rather thin black mould is a poor white gravelly sub-stratum, it presents a brown and withered aspect."

Hind's A. & S. Exp., Vol. 1, *pp.* 435-436, *Vol.* 11, *p.* 56 *(and map).*

Describes the northern portion as a dense forest of poplar. "Ponds and lakes are very numerous on the flanks of Riding Mountain, but as far as our opportunities enabled us to judge, the whole country, with the exception of narrow ridges, possesses a rich black fertile soil, supporting very luxuriant herbage.

The Riding and Duck Mountains consist of a succession of slopes and terraces on their south-western sides. General slope about 1 in 200, and covered with an impenetrable forest of balsam, poplar and aspen. The summit, a fine table-land of heavy clay soil, supporting a forest of very large white spruce, poplar, birch, aspen, and the north-eastern sides precipitous cliffs of clay.

Sandford Fleming, Pac. Ry. Rep., 1874, *p.* 36.

"The country passed over, as the traveller proceeds westward, alters its character. The level prairie landscape met in the neighbourhood of Red River gives way to more rolling land, while the soil is sandy loam, generally of good quality. The flora, as may be interred, is no longer the same. Before and after reaching Fort Ellice, we were occasionally at a loss for good water. All the running water is fresh and wholesome, but there are long stretches between the streams in some localities; the ponds which exist on the surface are frequently saline or brackish."

Henry A. F. MacLeod.

"The central portion of this block was examined along the trail to Fort Ellice, and along the trail from Shoal Lake to Shell River. The eastern part is an open undulating plain with fair soil. About Shoal Lake there is some good fertile soil, partially wooded, and the western part is poor stony soil, partially wooded. There is a good supply of fresh water in the streams and some of the lakes.

The trail crosses several deep and wide valleys. The north-western portion is fair soil, affording good pasturage, partially wooded. The land here is considerably higher than to the south."

Surveyor-General Dominion Lands Report, 1877—*Extracts from Surveyors' Report, pp.* 51 *to* 56.

The whole of this section has been surveyed and, with the exception of the northern part, laid out in Townships, and the land is now nearly all taken up by settlers; the Little Saskatchewan flows through the eastern part and Birds Tail Creek through the western. It is described as generally of fertile soil, well watered but having also some saline ponds, with clumps and groves of poplar and to the north-east heavily timbered with poplar, white birch and spruce of good size.

50/101 The Assiniboine flows southerly through the eastern portion of this section, and the Qu'Appelle enters about its centre from the west, and joins the Assiniboine two miles above Fort Ellice.

Capt. Palliser entered this section near the south-east angle, south of the Assiniboine.

Palliser, pp. 46, 47.

From Forked Creek to Fort Ellice north-westerly, following direction of Assiniboine—sandy soil, swampy lakes, poplar bluffs, good pasture, gullies running only short distance into plain, about 200 feet deep and one-half mile wide, their sides covered with dense but small timber.

Fort Ellice, two miles from junction of Assiniboine and Qu'Appelle, is built on a thickly wooded bank, at the foot of which flows Beaver River, 200 feet below.

At junction of Qu'Appelle and Assiniboine, the valleys of the two rivers are well wooded, but timber of little value; soil in neighbourhood is well fitted for growth of wheat, barley, potatoes, etc.; good pasturage. No trees of the pine family occur in this neighbourhood.

From Fort Ellice south-westerly towards the boundary line—Crossing Beaver River, where it emerges from large swamp, came to succession of well marked ridges, north-west and south-east, their summits clothed with poplar, with creeks and swamps between them.

Pipestone, or Snake Creek, is of considerable size, with banks 16 feet high. Crossed several hills of sandy drift, mixed with boulders, principally limestone.

The Palliser expedition also explored westerly from Fort Ellice, south of the Qu'Appelle. See section $\frac{50}{102}$.

Mr. Hind also traversed this section from the south to Fort Ellice, and thence westerly along the Qu'Appelle.

Hind's A. & S. Exp., Vol. 1, *pp.* 308-314.

"We arrived at the Assiniboine about ten miles south-east of the Two Creeks." The approach to this river is made by descending a steep slope, which forms the boundary of the prairie, two or three miles from its present excavated valley.

"The plateau thus formed is covered with erratics of granite, gneiss and limestone.

"The broad subordinate excavation in which the river flows is about one mile across, and from 200 to 250 feet deep.

"The narrow plateau, covered with boulders, points to a former condition, when a much larger river flowed in a wider and shallow valley, 200 feet above its present level. Thence passed through good grazing country on the high prairie level, on which there was a scarcity of water."

At the second of the two creeks cretaceous rocks were again recognized; a soft yellowish green substance resembling soapstone was observed in exposure of shales.

Country in the neighbourhood of Beaver Creek is undulating and attractive, but soil sandy, only supporting short stunted herbage.

Westward from Fort Ellice—In this section the country is rolling, soil a sandy loam, with much vegetable matter in valleys, numerous aspen groves and small lakes.

Sandford Fleming, Pac. Ry. Rep., 1874, *p.* 37.

"For a limited distance to the westward of Fort Ellice the land is light and sandy, but it again shortly becomes richer and less light, and the country is more rolling and broken. For some distance it may be described as being a series of shallow basins enclosed in a larger periphery."

Mr. Selwyn entered this from the east, travelling north-westerly towards Carlton.

Selwyn Geol. Rep., 1873-74, *pp.* 25, 26.

CAMP AT BIRDTAIL CREEK, TO FORT ELLICE. Approaching Assiniboine River, pass over five miles of stony plain with light sandy soil underlaid with gravel. Descent from plain towards river by two distinct plateaux. Edge of second overlooks Assiniboine valley 240 feet, above river, at 100 feet below level of plain, numerous springs of good water. Leaving fort, pass over two miles of rather rough country, poplar groves interspersed with swampy flats and stony rises; reached the valley of the Qu'Appelle River, which we crossed two miles above its junction with the Assiniboine. The Qu'Appelle River is only about 15 yards wide and 2½ feet deep, with a hard gravelly bottom.

On north side of it sand is the prevailing feature both along valley and on hills, and intermixed with it are numerous large blocks and boulders of gneiss. A similar sandy and arid-looking country appears to extend for a long distance in a westerly direction up the Qu'Appelle Valley.

"After crossing about 15 miles of mostly open plain, rather thinly grassed, with occasional willow and poplar clumps, the trail crosses a large swampy flat, covered with long green grass to the right, and several rounded hills and ridges of drift consisting of small rounded pebbles mixed with sand."

From one of these, "Spy Hill," though not more than fifty or sixty feet above the plain, an extensive view is afforded of the surrounding country.

Low drift hills and ridges, with intervening swampy flats, and a few lagoons, lakelets and scattered clumps of small poplar and brushwood are seen on all sides as far as the eye can reach. "Camped at 'Big Cut-Arm Creek,' having travelled 28·92 miles, the whole distance through a country similar to that above described. The soil generally light, sandy and gravelly."

The valley of "Big Cut-Arm Creek" is about 800 yards wide, and from 90 to 100 feet below the prairie level; the streams about 25 feet wide and 2 feet deep, with strong current. To west of the creek the soil is light and sandy, with subsoil of white gravelly sand; first part is rather thickly wooded with stunted poplars in patches; no other trees whatever; grass poor and brownish, except in depressions; the latter part, an open plain devoid of timber. Had to carry wood for night's camp.

Henry A. F. MacLeod.

The central and eastern portion is poor, stony soil, with groves of small poplar.

In the neighbourhood of Fort Ellice the soil is poor and sandy, partially wooded. To the north there is some good, fertile soil, partially wooded, and to the north-east, fair soil and good pasturage.

The valleys of the Assiniboine and Qu'Appelle are wide and deep, and the surface generally is flat and undulating.

Surveyor-General Dominion Lands Report, 1876—*A. L. Russell, pp.* 17, 18.

Meridian and Base lines have been run in this section up to the XXXth Range about 14 miles west of Fort Ellice.

THE SECOND PRINCIPAL MERIDIAN, longitude 102.—The country to south of Qu 'Appelle River on this line, "the land is good sandy loam, slightly undulating. There is plenty of wood, water and a fair supply of timber, that in the valleys of the streams being abundant and of fair size, whereas what grows on prairie level is almost invariably inferior in that respect and interspersed with clumps of willows; a few oaks, birches and some large poplars were seen at Scissors Creek.

The banks of the ravines and streams running into the Qu' Appelle River exhibit exposures of shale and thin layers of ironstone. These were the only outcroppings of geological interest met with during the season.

"At about two miles north of the river (Qu'Appelle) the land becomes of second-class quality, being more rolling and sandy for about 11 miles, when it again improves."

50/102 Mr. Selwyn travelled north-westerly through the northern part of this section.

Selwyn Geol. Rep., 1873-74, *p.* 26.

"Open undulating plain far as eye can reach; soil somewhat better; a hole dug two feet deep showed one foot black mould, underlaid with fine brown silt with a few pebbles.

"From open prairie, above Pheasant Hill Creek, could be seen to north-east and south an undulating, often hilly, treeless prairie; the ridges and hills often waterworn; gravel chiefly of gneiss, and encrusted with carbonate of lime."

Captain Palliser travelled westerly from Fort Ellice to the south of the Qu'Appelle.

Palliser, *p.* 50.

From Fort Ellice westward "a succession of short prairies, interrupted by belts of wood; passed by several small lakes and pools; thence across a thickly wooded ridge, having a considerable elevation, and running in a south-easterly direction."

The soil on this ridge "consisted wholly of comminuted fragments of the cretaceous Long Creek shales, and the wood principally young aspens."

Thence, after passing through very young woods over very irregular ground, "entered upon an open and level country of detached plains of considerable size, covered with clumps of very fine poplars, some measuring two feet in diameter; then, after passing for a few miles through woods, we emerged on an extensive plain, bounded to the south by the 'Weedy Mountains,' which seemed to be a continuation of Moose Mountain.

"After crossing this plain for 12 miles, over a surface broken into high abrupt ridges and mounds, and strewn with boulders, we reached a creek of considerable size flowing to the north, and which issues from a marshy lake lying along the northern edge of Moose Mountains."

Mr. Hind explored westward through this section south of the Qu'Appelle.

Hind's A. & S. Exp,, *Vol.* 1, *p.* 314.

Through rolling country, soil sandy loam, with much vegetable matter in valleys, numerous aspen groves and small lakes.

Continued through good land, aspen groves, numerous ponds, and entered on treeless prairie; west boundary marked by sandy ridge north-west by south-east, known as Weed Ridge. Beyond this ridge country is very undulating, boulders of silurian limestone and gneiss.

"The sterility of the Great Prairie, between the Qu'Appelle and the 49th parallel, is owing to the small quantity of dew and rain, and the occurrence of fires. North of the Qu'Appelle the country seemed to be more humid, and vegetation far richer and more abundant in many localities than south of that great valley."

Passed over another prairie, also bounded by ridges north-west and south-east.

Reached Indian Hill Range, a spur of Moose Mountains. This range is well wooded, and contains many beautiful lakes.

Sandford Fleming, Pac. Ry. Rep., 1874, *p.* 37.

"The higher land on the ridges may be described as being somewhat gravelly, while that of the low land is rich with peaty mould. Proceeding towards the Touchwood Hills, we met gentle slopes crowned with the aspen, with occasional small lakes, fringed by willows, many of them saline."

Henry A. F. MacLeod.

"The north-eastern portion consists of an open prairie with good fertile soil; to the north and west the soil is fair, with good pasturage and open. The surface is undulating, and the supply of fresh water limited, except at Cut Arm Creek."

50/103 Captain Palliser continued westward south of the Qu'Appelle through this section.

Palliser, pp. 50, 51.

"Passed over two more of the parallel ridges known as "Wolf Skin Mountain' and 'Man's Head Mountain' respectively, separated by narrow strips of plain; then kept a westerly, though very tortuous course, having to wind round innumerable swamps and marshy lakes; thence came to a wide ravine, 90 feet deep and half a mile across. The valley seemed to terminate abruptly to the south, as there, a bank covered with thick woods of poplar and cherry trees seemed to cross it at a distance of two miles. Encamped on a large lake with a stony shore."

"The country all round this lake is extremely irregular, rising into high hills, without any covering, but a scanty growth of grass; boulders are also abundant." Thence entered woods again which were scattered over level plains.

Hind's A. & S. Exp., Vol. 1, *pp.* 318, 319.

The view from Indian Head Range is exceedingly beautiful; it embraces an extensive area of level prairie to the north, bounded by the aspen woods on the borders of the Qu'Appelle valley.

"Entered a very beautiful and fertile prairie at foot of the Indian Head Range, our course leading us in a northerly direction to the Qu'Appelle mission."

"Six miles from the hills we arrived at a subordinate, shallow, and broad valley, parallel to that of the Qu'Appelle.

"The aspect of its boundary suggested the shore of a lake, or bank of a large river. The lower prairie consisted of a sandy loam, in which the Indian turnip is very abundant."

"We reached the Qu'Appelle lakes after passing through a magnificent prairie. In fact,the country north of the Indian Head and Chalk Hill ranges is truly beautiful, and will one day become a very important tract."

Mr. Dickinson, of the Hind Expedition, crossed through the north-western part of this section, south of File Hills, in his journey from the Qu'Appelle to Fort Pelly.

Hind's A. & S. Exp., Vol. 1, *pp.* 430, 431 *and* 422.

"The first fifteen miles through a very sterile region, the soil being a light, sandy clay, and in many places consisting of pure sand, covered principally with a low growing creeper bearing berries like the juniper, the grass is very short and scanty, and the aspens, which are the only trees, are very small.

"North of Wolverine Creek the country improves very much as to its soil and vegetation, but it abounds in marshes, swamps,and ponds of various sizes, around which grow willows and young aspens, and this character continues for about sixty miles."

"The Pheasant Mountain runs north-east and south-west, and may be from fifteen to twenty miles long. Like its western companion, File Hill, it is wooded with aspen and full of ponds and lakelets."

"The Greater and Lesser Touchwood Hills, the Pheasant Hill and the File Hill, all appear to be rich humid tracts, which will become important centres when civilization, in conjunction with population, reaches these solitudes."

Henry A. F. MacLeod.

"The north-east corner consists of an open plain, fair soil, good pasturage, fresh water scarce."

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104 *Palliser pp.* 51, 52.

Entering this section on the east side about 15 miles south of the Qu'Appelle, travelled westerly to the trading post near Squirrel hills over level plain with clumps of woods.

Thence to the Qu'Appelle Lakes, 18 miles to the north; "for the first four miles the track, which is almost due north, passes through open woods, with large lakes; making a considerable descent. After that, with the exception of a few clumps we saw no more wood, but crossed a level open plain We commenced to ascend steadily;" reached the Qu'Appelle River, descended into its profound valley, and riding along the river arrived at the Mission House.

Capt. Palliser then returned to the trading post near Squirrel Hills and continued the exploration westward.

At Squirrel Hills, good wood, water, and grass; thence westerly "our road, during the early part of to-day was mostly through a country moderately well wooded, over good land well suited to agricultural purposes, where there were also lakes and hay-producing swamps; but towards evening we began to observe symptons that showed us that we were again nearing the line of desert country, or the northern extension of the North American Arid Basin, towards evening passed many spots where the soil was poor and stony, and the growth of grass deficient."

On the following morning, from near "a small lake, had an extensive view of the Côtéau de Prairie, extending away to the north-west." There is now no more wood, except in the valleys of the rivers. "Our course was due west, and as far as the eye can reach, nothing but desolate plains meet the view."

"In the evening, reached the "Creek where the Bones lie," where we found water and very little grass; a few willows also grew here, but no wood fit for fuel."

Hind's A. & S., Exp., Vol. 1, *pp.* 320 *to* 330 *and* 421.

The Qu'Appelle Fishing Lakes are "narrow bodies of water, occupying an excavated valley about a mile broad, 250 feet deep; and differing in no important particular from the same valley at its junction with the Assiniboine, 120 miles distant by the river or 134 by the trail."

"Most beautiful and attractive, however, are the lakes, four in number, which from the rich store of fish they contain, are well named the Fishing Lakes.

"A belt of timber fringes their sides at the foot of the steep hills they wash, for they fill the entire breadth of the valley. Ancient elm trees, with long and drooping branches bend over their waters; the ash-leaved maple acquires dimensions not seen since leaving the Red River." Hops are here luxuriant, also the frost grape.

"The Qu'Appelle Mission is situated between the second and third Fishing Lakes," where the water is a quarter mile broad.

"On the south, a vast level prairie extends to Indian Head Hills; fertile, inviting, but treeless. Towards the north, the country is studded with groves of aspen, over a light and sometimes gravelly soil."

In the garden of the Mission, "Indian corn was growing,as well as potatoes, turnips, beans, and other culinary vegetables."

"The grass-hoppers had not yet (17th July, 1858,) visited the Mission, but vast flights had passed over it."

Mr. Hind proceeded hence, westward, up to Qu'Appelle Valley; and describes the prairie on either side to west of the lakes, as treeless and arid.

The valley continues about one and a quarter miles broad; and banks which now become treelees, 300 feet high.

The river is 60 feet broad and flows at the rate of one and a-half miles an hour through a rich alluvial flat producing superb pasturage; no rock exposures. "Drift and a yellow gravelly clay covers the country to a great depth."

The Northern part of this section was traversed by Mr. Hime, of the A. & S. Expedition, who describes it (see page 421) as a rolling prairie "interspersed with willow and aspen clumps and gravelly ridges until File Hill is approached, where a more humid tract begins, dotted with marshes and ponds." "On nearing File Hill the soil improves in character, and the country becomes more picturesque and attractive."

Bell's Geol. Rep., 1873-74, *p.* 72; *also* 80-81-82.

Mr. Robert Bell, of the Geological survey, explored the Qu'Appelle valley from its junction with the Assiniboine to the Forks, or junction with the outlet of Last Mountain Lake. The banks "are pretty uniform in their height, which averages about 200 feet, but the land often rises 100 feet higher a short distance back from the valley."

"The river is only from half a chain to a chain in width and sweeps from side to side of the valley." "The current is swift, but there is no obstruction to the descent of small boats from the Qu'Appelle Lakes to the Assiniboine."

From Qu'Appelle Lakes westward to the Forks at the junction with Last Mountain Lake, "the bottom of the valley is almost everywhere covered with a luxuriant crop of tall grass, which was said to make excellent hay. North of the valley the prairie is of a rolling character and is interspersed with clumps of bushes; the soil is a drab-coloured gravelly loam, with a black layer on the surface in the lowlands. Boulders abundant in some parts, while in others the surface is tolerably free from them."

Mr. Bell also travelled through about the centre of this section, entering it from the Dirt Hills, thence north-easterly to Fort Qu'Appelle, and onward toward the Touchwood Hills and describes the country passed over as follows:—

First ten or fifteen miles "over a swelling clayey prairie, with rough fissured hummocky surface. Thence throughout the remainder of the distance the country is hilly, with groves of poplar trees and clumps of willow bushes, and the soil has changed from brownish and drab clay to gravel, with black loam on the surface in the valleys and around the dry ponds.

"The country for the last ten or twelve miles, before coming to the valley of the Qu'Appelle, has become much more level, and the gravel is largely mixed with drab-colored clayey loam, and has a good surface consisting of black mould. The prairie here is 250 and 300 feet above the bottom of the valley."

From Fort Qu'Appelle, about due north towards the Mission at little Touchwood Hills, he thus describes:—"From the brink of the bank on the north side of the valley at Qu'Appelle Fort, the surface is very uneven all the way to the Mission." "The surface soil in the above distance consists almost everywhere of a rich black loam, with gravelly clay subsoil. Clumps of trees and bushes are scattered everywhere."

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105 *Palliser, p.* 52.

Capt Palliser continued his journey westward, crossing this Section about latitude 50° 25′.

"At Moose Jaw Creek we had both wood, water and grass." Its valley is 300 feet below the prairie level, sides steep and composed of sand with boulders on surface. West of this, passed several small lakes surrounded with swamps, and where grass was found for the horses. This portion is described on Palliser's map as "bare rolling prairie, no woods, scanty herbage."

Hind's A. & S. Exp., Vol. 1, *pp.* 334 *to* 338 *and* 421.

Continued explorations westward across this Section along the Qu'Appelle Valley.

"We crossed to the north side of the Qu'Appelle, when we arrived at the Grand Forks, and ascended the hill bank to the prairie. The Grand Forks consist of the junction of two deep and broad valleys, bearing a great resemblance to each other; the south valley is that in which the Qu'Appelle River flows, the other is occupied by Long Lake or Last Mountain Lake, 40 miles long and from one-half to two miles broad, being, in fact, an exact counterpart of the Qu'Appelle valley and lakes.

"It is narrow, deep, filled throughout with water, and is said to inosculate with the South Branch of the Saskatchewan some miles below the Elbow."

"From the Grand Forks to the Souris Forks (Elbow Bone Creek) the country is treeless, slightly undulating and poor. The Indians say that the Souris River of the Qu'Appelle, coming from the Grand Côtéau de Missiouri, inosculates with an arm of the Souris of the Assiniboine, and that a canoe in high water might pass from one river to the other without a portage.

"If this be the case the diversion of the waters of the South Branch down the Qu'Appelle valley would acquire additional importance, and give value to an immense extent of territory, now comparatively inaccessible and insufficiently watered.

"A few miles west of the Souris Forks the Qu'Appelle is 19 feet wide and one and a half feet deep, but the great valley is still a mile broad and 200 feet deep."

"After passing these Forks the country is more undulating, small hills begin to show themselves, the general character of the soil is light and poor, the herbage consists of short tufted buffalo grass, and plants common in dry arid plains."

Prairie fires are one great cause of the aridity of this region, and the reclamation of immense areas is not beyond human power.

"If willows and aspens were permitted to grow over the prairies, they would soon be converted into humid tracts, in which vegetable matter would accumulate and a soil adapted to forest trees be formed."

Beyond Moose Jaw Fork no tree, shrub or willow to be seen. The country is entirely destitute of wood.

The Northern part of this section was traversed by Mr. Hime in an easterly direction from Last Mountain Lake.—"Crossed a ridge supporting clumps of poplar, and then struck into an open prairie country, which soon became a series of high, gravelly knolls with numerous boulders on them.

"About 15 miles east of Last Mountain Lake, he ascended a high range of gravelly knolls, running from north to south, and then came to a valley 150 feet deep," with a chain of ponds in the bottom; then "another ridge of gravelly knolls was passed, and a descent made into the prairie," "rolling and interspersed with willow and aspen clumps and gravelly ridges."

Bell Geol. Rep., 1873-'74 *pp.* 70-73.

Mr. Bell travelled through the north-western part of this section from foot of Last Mountain Lake north-westerly towards Sand Hill Lake.

"Passed over an open, rolling prairie with ponds of fresh and of brackish water. The soil is a gravelly drab-coloured loam of poor quality, usually thickly strewn with boulders." "Sometimes, also, on the higher grounds, the boulders are formed into low ridges with scarcely any admixture of soil." Struck the Little Arm River, "the valley of which is between 200 and 300 feet deep in its bottom a strip of bright green wood is sometimes seen, forming a pleasing contrast to the monotonous gray of the prairies above." This valley enters the west side of Last Mountain Lake.

Mr. Bell also crossed the south-west angle of this Section. See sections $\frac{49}{105}$ and $\frac{50}{105}$.

$\frac{50}{106}$ *Palliser, pp.* 52, 53.

Captain Pallisor crossed this section westerly in latitude aoout 50° 28″.

Crossed "over a succession of ridges or prairie rolls, among which are a number of lakes. These ridges are composed of a light yellowish sand of a very fine grain, the sides of many of which supported berry-bearing bushes and a few poplars."

Camped at a small lake "around which was a swamp with grass for the horses. Cooked supper with buffalo chips and a portion of the wood we had brought from Moose Jaw Creek; the land we had travelled over not differing from the nature of that, which we had been traversing for several days back." Latitude at noon, 50° 28′; longitude, 106° 50′.

This part of the country is described on the Palliser map as "bare rolling prairie, no woods; soil of sandy clay, baked and fissured with the sun's heat."

Hind, A. & S., Exp., Vol. 1, *pp.* 349 *to* 354.

Mr. Hind continued his journey north-westerly through this Section, passing Buffalo Pound Lake. Tho Sand Hill Lake lies at the north-west angle of section.

BUFFALO POUND HILL.—"The whole country here assumed a different appearance; it now bore resemblance to a stormy sea suddenly become ridged;" the hills of gravel and very abrupt; none exceeding 100 feet in height. "The Côteau de Missouri, particularly "Dancing Point," is clearly seen towards the south, while north-east the last mountain of Touchwood Hill range looms grey or blue. Between these distant regions a treeless plain intervenes."

EYEBROW HILL RANGE—"A prolongation of the Grand Côteau," four miles from the valley of Qu'Appelle, "150 feet above the prairie, and forms the flank of a table land stretching to the Grand Côteau." The source of the Qu'Appelle is in this range. "On the flanks of the Grand Côteau the true prairie may be said to terminate and the plains to commence."

Sandy Hills.—These "hills commence on the north side, about two miles west of Sand Hill Lake." "They are drifting dunes; many of them present a clear ripple marked surface without any vegetation, not even a blade of of grass." "A peculiar feature is that many boulders or erratics are distributed over the western extremities of the small hills or ridges into which the steep banks are broken, 70 to 120 feet above the level of the flats." "They vary in height from 10 to 30 feet, in length from 60 to 140 feet, and in breadth from 20 to 80 feet." Ponds occur in the great valleys among these sand hills, which send their water both to the South Branch and to the Assiniboine.

Eyebrow Hill Stream.—"A section of the bank of the Eyebrow Hill Stream, in its course through the flats, showed fine clay brought by recent rains from the hill banks, sand blown from the dunes, and loam produced by the blending of the two. Where it leaves the prairie the little river has exposed a section of a drift hill, round the base of which it sweeps. Gravelly drift is seen to repose upon an ochreous stratified rock, seamed with veins of selenite. It exhibits a stratum of yellow and red ferruginous clay, about six feet thick, and below hard greenish sandstone in which gigantic concretionary masses are numerous." "This is the first rock seen in position above the Mission. Subsequent comparison with rocks on the South Branch showed it to belong to the uppermost member of the Cretaceous series."

Bell Geol. Rep., 1873-74, *p.* 73.

Mr. Bell travelled through the northern part of this section to Sand Hill Lake. See also section $\frac{50}{105}$.

"The Sand Hills begin on the north side of the valley, about two miles west of Sand Hill Lake, and continue for several miles; the exceptional abundance of sand at this locality is probably owing to the existence of beds of sandstone in the neighbourhood."

Mr. Bell also traversed this section to the north of Old Woman's Lake, passing south-easterly towards the Dirt Hills. See section $\frac{50}{107}$.

North end of Old Woman's Lake to north-east point of Dirt Hills, 86 miles; surface generally of rolling character; soil in valleys and more level parts seems to be derived directly from clays, pieces of clay iron-stone were found upon surface; the higher grounds are occupied by gravelly earths and boulders; the clayey ground is broken up by sun cracks, rendering it hummocky, and difficult to travel over with a cart."

Mr Ogilvie,

Entered this section near its south-west angle, and travelled north-westerly between the Old Woman's Lakes to Buffalo Pound Lake on the Qu'Appelle, and describes it as "a rolling prairie, sometimes rising into high gravel knolls; most of the flats are good soil, and everywhere there is good grass but very little water, most of it alkaline; the country continues so to within 12 miles of the Qu'Appelle River, which I struck about 15 miles above the lake known as Buffalo Pound Lake."

$\frac{50}{107}$ *Palliser, pp.* 53, 54.

Captain Palliser traversed this section from about latitude 50° 30′, north-westerly to the South Saskatchewan near the Elbow in latitude 51°.

Still obliged to use the wood brought from Moose Jaw Creek. Continuing on, crossed "a small stream (Sage Creek) tributary to the Saskatchewan, where we found wood, water and grass. The creek is winding and depressed considerably below the prairie level, and its sides are strewn with boulders. The plants do not materially differ from those at Moose Jaw Creek. Here we, for the first time, met with the sage, which is a low shrub, characteristic of the great American Deserts."

"Although the country throughout was arid and sterile, still muddy swamps very frequently occur." "The grass in this arid region, always so scanty, was now actually swept away by the buffalo, who, assisted by the locusts, had left the country as bare as if it had been overrun by fire; even at the edge of Sage Creek we could obtain very little grass for our horses."

September 22nd—"Left Sage Creek early and breakfasted on the banks of the South Saskatchewan. "These are lofty and sandy; the points of the river are slightly wooded with willow, birch, and rough barked poplar."

The Valley of the South Saskatchewan.—The valley is about one and three quarters of a mile wide and depressed 228 feet below the surface of prairie. The river averages 600 yards in width.

The banks are of drift with an immense quantity of boulders, until the Côteau is approached, when soft purple clays of the Cretaceous age appear containing large quantities of gypsum.

On the banks, beside the poplar, the cotton wood and other vegetation similar to the Missouri, including the cactus, were found.

Height of Land.—The country to the east of the Elbow was explored "and found a small stream descending to the Saskatchewan from swampy lakes.

"These lakes also send off waters to the Qu'Appelle, flowing in the opposite direction; and a very remarkable feature exists here, viz: that the summit level which divides these two streams lies in a valley more than 100 feet deep, and continuous with that of the Qu'Appelle only 90 feet above the Saskatchewan. This valley runs north, north east and south, south-west. To the westward is a country covered with sand hills, at the base of which are beds highly impregnated with iron, and containing small land shells."

Hind's A. & S. Exp., Vol. 1, *p.* 355.

Mr. Hind crossed the north east angle of this section, where is situated the height of land between the Qu'Appelle and South Saskatchewan.

The Valley of Qu'Appelle at the Height of Land.—The valley here is 110 feet below the first plateau; its breadth, although partially invaded by sand dunes, is nearly one mile. Sand hills or dunes cover the country for a considerable distance on both sides.

Bell Geol. Rep., 1873-74, *pp.* 73 *to* 76.

Mr. Bell crossed this section at its north-east angle and reached the South Saskatchewan at "the Elbow;" thence 32 miles up the river to "Ochre Hills" and thence south-easterly, passing north of the Old Woman's Lake.—

"As already mentioned, the valley of Big Arm River (Qu'Apppelle) is continuous with that of a small brook which runs westward into the South Saskatchewan at the Elbow."

In approaching the height of land between them, the valley becomes wider, and the banks are much less abrupt; the plain is sloping gently down on either side. The dividing point of waters is marked by a low swelling across the bottom of the valley. "About two and a-half miles east of height of land a low ledge of sandstone is exposed."

At the Elbow of South Saskatchewan "found loose pieces of lignite; it is probable that the bed from which these fragments are derived exists within the first 20 miles above Elbow."

Informed by intelligent Indian, he had seen similar pieces of lignite in South Saskatchewan, near the junction of Red Deer River. "Lignite reported to occur in large quantities *in sitû* in bank of Swift Current Creek," a tributary of the South Saskatchewan, flowing from the Cypress Hills, and joining the river about half way from the mouth of Red Deer River to the Elbow.

Mr. Isaac Cowie reported having seen lignite on hill, one mile and a-half from Hudson's Bay Houses at Cypress Hills.

Red Ochre Hills, 32 miles up the river from Elbow.—Banks 200 feet, and top of Red Ochre Hills 500 feet above the river. "This elevated ground stretches for considerable distance to south and south-east, and presents an extremely hilly appearance." Soil gravelly earth in this region; there are numerous ponds and small lakes in the hollows among the hills, most of them being more or less brackish or nauseous to taste from the presence of the sulphates of magnesia and soda and other salts.

During the dry season of autumn, the water evaporates completely from many of these ponds, leaving their beds covered by the dry white salts, which look like snow, and are blown about in the wind. Around all the ponds, except those which become completely dry, there is a rank growth of reeds, sedges and grasses, the deep green colour of which forms a strong contrast to the dull grey appearance of the stunted and scanty grasses of the hills, which, indeed, in many places, are almost bare.

"From a point on the south-east bank of the Saskatchewan, about 40 miles above the Elbow, we followed a south-easterly course to the northern extremity of the most northern of the "Old Wife Lakes," which we reached at 24½ miles from the river bank, according to our odometer measurements. These lakes are three in number, and appear to lie in a chain running north north-west and south south east. They are said to be connected to each other by narrow straits, and to have a total length of 30 to 40 miles."

The middle lake receives a stream called the "Old Wife's Creek," which flows from the direction of Cypress Hills; but none of the lakes have any outlet.

The water is very clear and extremely nauseous to the taste. There is a considerable quantity of white salt around the shores in the dry season.

The country around the northern extremity of the Old Wife's Lakes is not so hilly as that between this point and the Saskatchewan.

50
108 Nothing reliable known.

50
109 The Red Deer and the South Saskatchewan Rivers enter this Section from the west, and unite at the "Forks," about long. 109° 30', near its northern boundary.

Palliser, *p.* 139.

Capt. Palliser traversed this section easterly along the south side of Red Deer River, passing over an arid, sandy plain with boulders to the "Forks."

Arrived (at the Forks, "and contemplated the view with some satisfaction, having now penetrated to that region from the west, in July, 1859, which we had reached from the east in September, 1857, before we turned off to the North to winter quarters at Carleton. Viewing the two river valleys from the high lands at the junction, they presented a considerable difference in appearance. Red Deer River was a serpentine stream, with broad alluvial promontories containing willows and rough bark poplars; while Bow River (South Saskatchwan), as far as I could see down stream, was betwen high precipitous banks, and where the tops of a few willows were seen appearing out of heaps of sand."

Found good grass for horses in Valley of Red Deer River. He then travelled south-westerly to crossing of South Saskatchwan; and passed over sandy waste, a succession of sandy hills with great scarcity of water, and halted at a salt lake, which was the only water that could be found. Very heavy travelling through the burning sand. "In the evening, left the high broken country and descended into valley running north and south."

Col. MacLeod and Capt. Clark.

Traversed this section north-easterly from the Cypress Hills to the Forks. See sec. $\frac{51}{109}$.

Col. MacLeod describes the country he passed through in this section as a prairie of poor sandy soil and pasture, scarcity of water, which was principally brackish.

$\frac{50}{110}$ *Palliser, pp.* 139, 140, 141.

Capt. Palliser traversed this section easterly, through its northern part, along the banks of Red Deer River, and passed over a broken country with sandy soil and boulders; also, large swamps, now nearly all dry.

Travelling "several miles along river, found favorable place to ford 250 yards, wide with firm bottom and water up to axletrees." On south side, passed some fine wooded bluffs with large poplars, and ascended with difficulty out of the valley on to a high plain covered with boulders, but were obliged to again descend to river for water.

Capt. Palliser also travelled south-westerly, on the north of the Saskatchewan, and crossed the river at about lat. 50° 28′, and proceeded south towards Cypress Hills. The following extracts relate to this portion :—

"Continuing journey found the ground very much broken and travelling very severe on horses; soil worthless; camped on swamp and killed several rattlesnakes.

"Arrived at the South Saskatchewan and camped at the only bluff of woods to be seen in the valley, which is here far more expanded than below the Forks of Red Deer; the banks also are very lofty; breadth of river 250 yards, and from five to eight feet deep. Started several grizzly bears; this seems to be a favourite haunt for them."

CROSSING OF SOUTH SASKATCHEWAN TO CYPRESS HILLS.

On the south side of the Saskatchewan the ground rises to 240 feet above the river; found fresh water and better grass. At six miles south-east of the river came in sight of the Cypress Mountains; water only in detached pools and a little brackish.

"Made a long spell through a most desolate-looking country without either grass or water, making straight for the Cypress Hills, which form a blue line to south-east of considerable height."

Col. MacLeod

Crossed the south-east angle and describes this country as a poor sandy soil and pasture; water scarce and principally brackish.

Capt. Crozier,

Traversed the northern part of this section on his journey between Fort Calgarry and the Forks of the Red Deer and South Saskatchewan during the spring of 1878. He states that it is entirely without timber except in the river bottoms; and on approaching Red Deer River from the west the soil gradually becomes light and more sandy, and the grass of a lighter growth; the country is more rolling, and near Red Deer River is hilly, very sandy, and water scarce.

"The approaches to the Red Deer River are difficult, the banks on either side being high and steep; pine and cottonwood are found on the river bottoms, but by no means plentiful. As a general thing the soil on the river bottom is very light and sandy. The bed of the river is filled with quicksands, and the crossing, unless the ford is well known, is very dangerous work. I think I am safe in saying that the above remarks will apply to the South Saskatchewan, at any rate, that part between the mouth of Bow and its junction with the Red Deer."

Mr. Ogilvie,

Travelling from the north, struck the Red Deer River in the north-west angle of this section.

Red Deer River.—From the "Nose" to the Red Deer River, a distance of 95 miles, there is no wood, but in the valley of the river there are some poplar, choke cherries and a species of birch closely resembling the silver-leaved birch.

"On the river the soil is generally light and gravelly, with many granite boulders on its banks; the bed of the river is composed of red sand, and it is literally covered with coal dust, which has been brought down the river from seams near the Mountains.

"On the river are many exposures of cretaceous sandstone, but so soft as to be of no economic value. Some of the exposures present a very picturesque appearance."

$\frac{50}{111}$ *Mr. Ogilvie.*

Crossed this section south-westerly from Red Deer River to Bow River.

"For about 20 miles the soil is generally gravelly, with some patches of fair soil, and some ponds of water, generally fresh. Near Bow River the soil begins to improve, and close to it and in its valley some of the finest soil is to be found."

Capt. Crozier crossed the northern portion of this section. See sec. $\frac{50}{110}$.

$\frac{50}{112}$ *Mr. Ogilvie.*

Travelled north-westely up the Bow River to the Blackfoot Crossing, and thence south-westerly to Fort McLeod.

Bow River to Blackfoot Crossing.—"The valley of the river is without timber until we come within about eight miles of Blackfoot Crossing, when patches of poplar occur, and as we approach the crossing become continuous; sometimes on one side, sometimes on the other and sometimes on both; in places there are patches of small spruce. Up the river for 20 miles in a straight line, the soil continues good, and report says that up at Calgarry and along the base of the Mountains it is equal to the best in the Territories, and is well watered, while the facilities for getting down timber from the Mountains, where it is said to exist plentifully, are good.

"There are numerous exposures of coal on Bow River and in its vicinity, many of which will in future be valuable.

"Close to Blackfoot Crossing is a fine spring, which preserves such a uniform temperature that we may safely infer that it stands near the mean annual temperature of the place. There is another, about 20 miles up the river from this one, in the bottom of a very deep ravine, of which much the same remarks may be made.

"I took the temperature of the former about the 1st of September, and found it to be 44°; and again near the 1st of November, while we were having a severe snow-storm, and found it to be 43½°. The temperature of the latter I found, in the middle of October, to be 43½°. The temperature of both I found to be entirely uninfluenced by daily changes of temperature, or changes of temperature due to changes of weather, and neither of them ever freeze. Now, as the temperature of such springs is usually a few degrees above the mean annual temperature, we may safely infer that the mean annual temperature of the place is about 40° or perhaps a little more; the mean annual for Toronto being about 44° and that for Ottawa about 40°."

BLACKFOOT CROSSING TO FORT McLEOD.—"Here we pass over some as fine soil as can be found in the Territories; some of it would compare favourably with some of the best in Manitoba, to which the growth of the grass everywhere testifies. There are some high gravel ridges along the watershed between the Bow and Little Bow Rivers, about ten miles north from the Little Bow River."

Col. MacLeod.

Travelled from south-east angle of this section, north-westerly along the Bow River to the Blackfoot Crossing, and thence south-westerly towards Fort McLeod. See sections $\frac{51}{109}$ and $\frac{42}{113}$.

Capt. Crozier.

On his journey between Fort Calgarry and the forks of the Red Deer and South Saskatchewan Rivers, during the spring of 1878, traversed the northern portion of this Section, and describes it as "a country entirely without timber, excepting at intervals on the bottoms of the Red Deer, Bow and Saskatchewan Rivers. The water is in ponds or lakes and is mostly surface water, which, of course, cannot be depended on during a dry season. I found the water very scarce, even so early as March, but there had been very little snow the winter before; as a general thing, no doubt there is abundance of water as early in the year as this."

"For about the first sixty-five or seventy miles from Fort Calgarry, the country might be called a level prairie, and the grass of quite a heavy growth; after that, the soil gradually becomes lighter and more sandy, and the grass of a lighter growth; the country is more rolling, and as you draw near the Red Deer River it becomes hilly and very sandy.

"From personal experience, and from information I have received, I should say the foregoing remarks, speaking generally, will apply to the whole of the country known on Mr. Fleming's Map (1876) as 'The Plains,' excepting that portion west of, say, a line drawn from the mouth of Arrow River to Fort Calgarry; therefore I think a description may be given by saying, it is a plain country, without timber, or, at any rate, with but little timber; the water principally surface water, in lakes or ponds, and scarce during the dry season, and the soil richer and grass more plentiful the closer you are to the mountains.'

Palliser, pp. 144 *and* 145,

Dr. Hector, of the Palliser Expedition, crossed the south-west angle of this section, travelling north-westerley, and passed over hills marked on the map as "arid hills."

"Made an ascent of 600 feet and the hills seemed to rise about 200 feet more. They seemed to be formed of banded clays, as their chalky surface and white, muddy flats are exactly the same as those to the north of the Hand Hills.

"Had a fine view from the top of one of the hills; at their base lay a flat valley, four miles wide, with large swamps, and the channel of a stream winding through it. To the west this valley was bounded by a range of hills similar to those we were now upon, and over them appeared the tops of the Rocky Mountains, still looking very distant.

"A descent of 600 feet brought us to the bottom of a valley where there was some good grass, and in the swamps ducks and geese; there was no timber however, excepting a few low willows."

$\frac{50}{113}$ *Palliser, p.* 91.

Captain Palliser travelled southerly from Lake Oscar through the western portion of this Section.

The distance from Lake Oscar to the South Saskatchewan (Bow River) is two miles. Here "the river banks were about 120 feet high and the river valley about one mile in breadth, bearing a fair growth of willow, poplar and berry-bearing bushes. One rough-bark poplar measured nine feet seven inches in circumference, also saw a fine hummock of spruce firs about two miles up the stream. We found the river about 200 yards wide and its channel deep." Lat. 50° 55″. "On resuming our course to the southward, we found ourselves once more within the Fertile belt; the land was good and rolling in character, though frequently covered with boulders.

"The feeders to South Branch (Bow River) contained considerable growth of timber of fair size. The valley and the country adjoining, which was undulating, contained fertile land, with willow and poplar bush on its northern exposures

"We crossed Pine and Sheep Rivers. The latter was a stream about 90 yards wide and three feet deep, its valley about a mile wide and well wooded."

Proceeding south, "the couleés were not so abrupt as yesterday; the timber was better generally, although none of it could be called valuable.

"Measured a balsam poplar nine and one-half feet in girth at height of my shoulder. Saw plenty of spruce fir in two insignificant tributaries." Lat. 50° 6′; were now riding along the western flank of the Porcupine Hills.

"Crossed a tributary of considerable size, name unknown; proposed to the men to call it Arrow River, as it belonged to Bow River; the proposition was highly approved of, and the stream is now Rivière de la Fléche. Arrived at Porcupine Hills and camped at considerable elevation. Saw some very old stunted cedars; was disappointed at the timber. The whole place was more or less destroyed by fires."

Palliser, pp. 145, 146.

Dr. Hector entered this section from the east at about lat. 50° 18′, and travelled north-westerly to the north west angle to the point where Moose Creek enters Bow River, and thence westerly.

Continuing description given in section $\frac{50}{112}$, thence entered "the Western range of hills at a small lake, with ledges of sandstone cropping out along its margin. The latitude here was 50° 23′ 39″."

"We crossed the hills and descended to the west to extensive plains, seeing Bow River in the distance. The pasture is now much finer than before, but still no wood.

"At night reached a considerable stream flowing to north through a pleasant looking valley, with good grass but no wood."

After 11 miles to north-west we again struck Bow River. The pasture, though still poor, is much improved on the plain, but the change is most marked in the valley of the river, which is now rocky, with high cliffs of sandstone, like the upper part of the North Saskatchewan, and with a good growth of pines and large poplars.

"The valley is wide, with large wooded flats, but the river itself is narrow and rapid, and channel occupied with shingle islands. The water is beautifully clear, of a light green tint, which shows that we are now to west of all cretaceous clays, which render the river so turbid in lower parts of its course."

Along the bank there is a great profusion of wild fruits, and "in this part of the country there is great abundance of large game. Thence kept along the top of the bank, which is nearly 500 feet high, and composed throughout of sandstone, with beds of clay and carbonaceous streaks, like the strata at Rocky Mountain House, and on the upper part of all the river, indeed, as the mountains are approached."

"Encamped in a most beautiful spot by the river, among large trees," dense thickets of berry bushes."

"A few miles brought us to the 'Stony Indian' camp, (lat. 50° 43′) situated in one of the prettiest spots I have seen in the country, at the mouth of 'Ispasquehow' or High Wood River," "which is a clear stream 40 yds. wide, rising in the Rocky Mountains, and flowing N. N. E. to the point where it joins the Bow River. Like Bow River it has a valley depressed 200 feet below prairie level; a little above the mouth" of this stream "Bow River can be forded in low water, the depth at this time (August) being nearly two and a-half feet." Then ascending through picturesque scenery to level of plain, and continuing along right bank; "the pasture is now very fine everywhere, and timber plentiful in many places, as we have now entered the belt of fine country that skirts the base of the Mountains."

"Crossed Capt. Palliser's trail on his trip to the boundray line in the previous summer, 1859."

Col. McLeod,

Referring to Morleyville, which is situated on the Bow River in this section, states:

"The Rev. Mr. Macdougall and others speak in the highest terms of the beauty and fertility of the country about Morleyville near the head of Bow River." See also Col. McLeod's remarks in sec. $\frac{42}{113}$.

Capt. Clark,

Who has travelled frequently through this country states:

"The country north of Fort McLeod, as far as the crossing of the Bow River, is a fine grass one with plenty of water, and the land on the Bow River is of very superior quality. Cotton wood also grows on this river very thickly. At Fort Calgarry, some ninety miles north-west of "The crossing," and on the same river, a very fine country is found; at this place there is a small settlement of half-breeds, and there are several white settlers engaged in farming and stock raising, and all speak in high terms of the capability of the country.

Forty miles south of Calgarry another small settlement has started up, this is known as Morleyville, and the farming operations have at this place also been a success. It is a beautiful country around Morleyville with the grand scenery of the Mountains towering above the little settlement. This is the home of the Stony Indians, a Christianized band. At Fort Macleod and all over the Bow River district horses and cattle graze out during the winter, and as a fair proof that the grass has not lost all its nourishment during this season of the year, I may state that the Police horses, when out on herd, only receive three pounds of oats per diem, and do well on that small amount.

At Cypress Hills, although cattle and horses graze out during the winter, they do not do as well as those in the Macleod and Bow River country; this is owing to the severe storms that sweep through these hills (Cypress.)

Coal is to be found in the Cypress Hills, and on a stream a few miles west of them. It is also found in quantities on the St. Mary's River some 24 miles east of Fort Macleod; and I know of a large vein near the crossing of the Bow River.

Capt. Crozier.

Has also travelled this section from Calgarry, which is situated near its north-west angle, eastward. See his remarks in sec. $\frac{50}{112}$.

Mr. Ogilvie,

Crossed the south-east angle. See his remarks in sec. $\frac{50}{112}$.

$\frac{50}{114}$ *Palliser, p.* 146.

Dr. Hector entered this section a short distance south of the Bow River, and travelled north-westerly.

"Up the valley of Swift Water Creek in full sight of the Mountains, which were covered with snow from recent storms. The country here is exceedingly beautiful, having a rich black soil supporting good pasture, with a large proportion of vetches; the low hills are covered with clumps of wood, having almost the appearance of artificial plantations; thence passed over a high plateau covered with long grass and willows.

"16th August.—The night very cold, and in morning water was frozen over."

Palliser, p. 92.

Capt. Palliser entered this section near its south-eastern angle, and travelled north-westerly.

Passed "along a narrow ledge of land elevated some 20 or 30 feet from the lands on our west, and more than 200 feet higher than the prairie, which dipped suddenly into a great basin. The plateau we were riding along was never more than 200 yards wide, and in some places not more than half that number of feet across; this singular strip of table land extended for four miles due north and south, and in the bottom of the basin were three long lakes divided the one from the other by narrow rushy swamps."

Thence passed "through spruce, fir and small pines," and great quantities of fallen timber, and continued travelling "through woods in a northerly direction, crossed two or three little creeks and grassy patches of high land."

THE FOOT HILLS OF THE ROCKY MOUNTAIN—Begin in this section, and the Fisher and Livingstone ranges of mountains rise in the western part.

FROM THE 100TH TO THE 115TH MERIDIAN AND BETWEEN THE 49TH AND 50TH PARALLELS OF LATITUDE.

$\frac{49}{100}$ *Palliser, Expn., pp.* 44 *to* 46.

Turtle Mountain is 250 to 300 feet above general level, consists of drift, accumulation of coarse sand, and shingle with boulders of angular limestone, granite, gneiss and other azoic rocks. The forests which cover the mountain are not of much value, being of poplar and stunted crooked oak. Country in neighbourhood is very beautiful, and similar to that of East Pembina River.

From its summit an extensive view is obtained not only to the north, but also away to south and west over American territory. Nothing but bare and barren prairies visible.

Turtle Mountain to Souris River.—A long expanse of bare plain, then crossing a ridge of broken ground running westerly. The woods which skirt the Souris commence four miles from the river. The country immediately adjacent to north side consists of numerous conical sand hills.

The river cuts through a rich alluvial bottom, eight to ten feet deep, and is subject to great floods. River is 50 yards wide and four feet deep in shallowest places. Fragments of coal were found in bed of river at crossing, derived from bed of rounded shingle which underlies sand hills, or in some cases may have been carried down stream from outcrop of lignite which occurs higher up.

Souris River to Snake Creek.

Loose sandy soil with swamps. Snake Creek of inconsiderable breadth, five feet deep.

Snake Creek to Forked Creek.

Swampy, then bluffs of wood belonging to Valley of the Assiniboine but five or six miles from that river. The land in this neighbourhood is rich with some good wood. Thence level country, with occasional groups of sandy hills, bluffs of woods and small lakes.

Hind A. & S. Exp., Vol. 1, *p.* 291 *to* 299.

From last ridge of Blue Hills, Section $\frac{49}{99}$.—"Before leaving the last ridge of Blue Hills we came suddenly upon the borders of a boundless level prairie on the opposite side of river, 150 feet below us, of a rich dark green colour, without a tree or shrub to vary its uniform level, and with one conical hill in its centre."

Proceeding from Blue Hills to south bend of Souris River, exposure of shale with bands of ferruginous concretions occurred at every bend; the first specimen of lignite was seen at the mouth of Plum Creek. No trees or shrubs between Blue Hills and Plum Creek. "On low points of Souris Valley some fine oak, elm, balsam, and aspen are found for the first twenty miles." "A little beyond Plum Creek we found numerous pebbles and boulders of lignite" "from the size of a hen's egg to one foot in diameter," and three miles further on occurs last outcrop of cretaceous shales. "The low hills about Plum Creek are sand dunes." Prairie east and west of Souris is treeless.

The Sand Hills.—"Near Hudson Bay Company's house found extensive deposits of bog iron ore, capped by shell marl," covered with drifted sand. Bank of river 25 feet high, with narrow fringe of fine timber. "The country becomes very low after passing the last sand hill, and over a large extent of prairie to the south drift timber is distributed." The valley of Souris here varies from one-quarter to one mile in breadth, the river twenty-five feet broad and very shallow, flowing through a rich open meadow twenty to thirty-five feet below general level of prairie, "which on either side is undulating, treeless, covered with short stunted grass, and showing an abundance of last year's "bois de vache." "Before reaching the 49th parallel the Souris meanders for many miles through a treless prairie."

"Turtle Mountain on east rises nobly from great plain." "Country west of Souris is a treeless desert, in dry season destitute of water."

"The breadth of this arid and woodless tract is at least sixty miles north of Red Deer's Head River on 49th parallel."

"A vast number of gneissoid and limestone boulders are strewed over the hill banks of Souris" near the boundary line.

Surveyor-General Dominion Lands, 1877. *Extract from Surveyor's Report, pp.* 51 *to* 56.

One tier of townships has been laid out on the northern part of this Section, intersected by the Assiniboine and Little Saskatchewan Rivers.

The country near these rivers is hilly and broken. The soil in the bottoms is of rich quality· a good deal of the uplands, however, is stony and gravelly, but there is also some fine fertile prairie land comprised in the townships.

49

101 *Hind, A. & S., Exp. Vol., I, pp.* 305-306.

From boundary north to Pipe Stone Creek passed over a perfectly level vast treeless desert with little valleys containing ponds; was informed by Half Breeds that this great prairie west of the Souris continues treeless and arid for 60 miles, then crossed by a river, probably the Moose Mountain Creek, and beyond this it continues for 80 miles further without tree or shrub; further they could give no information. "Pipe Stone Creek at our crossing is 20 feet broad 1½ to 3 feet deep, with swift current. The valley is narrow but rich, and beautiful in comparison with the desolate prairie lying to the south. Ash leaved maple is the most abundant amongst the trees fringing its banks."

The hop and frost grape also flourish on edge of stream. "On hills in neighbourhood boulders are uniformly distributed."

After passing Pipe Stone Creek "the prairie is either undulating and sandy, or varied with low hills of drift, on which boulders are scattered." In dry season this region is destitute of water.

Dawson's Geology and Resources of the region in the vicinity of the 49th Parallel, 1875, *pp.* 290-291.

Souris River.—At the intersection of the boundary line the Souris River is nearly one mile in width, including some flat and very fertile alluvial land and limited quantity of timber, chiefly elm, massed in fine groves.

The region between 1st and 2nd crossing of Souris River, by the boundary line, is about fifty miles in width, gently undulating, with many shallow basin-shaped hollows, which are filled with water in spring and produce a tall growth of swamp grass and contrasts strikingly with short crisp grass of surrounding prairie. Soil, perhaps, rather thin and gravelly, but deeper and richer in vicinity of North and South Antler Creeks.

Along valley of the South Antler there is a good belt of trees for many miles. Surface covered with strong sod of short grass. "The vegetation of this part of Second Prairie Steppe appears slightly in advance of Red River valley," which "may arise as much from warm and dry character of soil as from any absolute difference of temperature."

The above describes the eastern and southern portions of this section, and the remainder is probably of the same poor character.

49
102 *Palliser, p.* 49.

Moose Mountain, 340 feet high, similar in appearance to Turtle Mountain, distribution of wood on this hill and its environs exact counterpart of Turtle Mountain. (See section $\frac{49}{100}$.) To south and west a plain of boundless extent, unbroken by even a single tree.

Approaching Souris River, the ground is covered with boulders of gneiss. Valley very extensive, and from level of plain to alluvial bottom below is 139 feet. Channel of river 30 feet deep; stream 20 yards wide but very little water. Found thin seams of lignite or coal of an inferior quality, neither in quantity or of quality ever to be of commercial value. But *Note* on Palliser's map states, "the coal is of a quality favourable for smelting."

La Roche Percée is of sandstone.

Dawson G. and R. of 49th parallel, 1875, *p.* 291.

The Souris at present crossing flows in valley with rounded grassy banks, well fringed with wood, and continues to be so as far as "Wood end" (262 mile point), or 80 miles by course of stream.

Between 2nd crossing of the Souris and the Missouri Côteau (from 215 to 290 mile points), the prairie still shows gently undulating surface, with short thick growth of grass. Soil, in passing westward, becomes more sandy and stony, and some large tracts are so profusely covered with boulders as to be rendered permanently unfit for agriculture. No sudden change of soil marks passage from Cretaceous to Tertiary in this region, surfaces of both formations being marked by thick deposit of marly drift. "About the middle of September, 1873, on the prairie between Turtle Mountain and the Côteau, grass was dead nearly to roots, but last year (1874), in this region the grass was fresh and good." "The short prairie grass even when dry proves nourishing food."

Dr. Hector passed diagonally through this section from north-east to La Roche Percée, and Mr. Dawson along its southern boundary.

49
103 *Dawson G. and R. of 49th parallel,* 1875, *p.* 291.

The description of the southern portion along the boundary line is similar to the previous section; undulating surface with short, thick, growth of grass, soil becoming more sandy and stony. The second prairie plateau comes to an end in this section, against the foot of the great belt of drift deposits known as the Missouri Côteau.

49
104 *Dawson G. and R. of 49th parallel,* 1875, *p.* 293.

The Missouri Côteau extends over the southern portion of this section. The Côteau is thus described by Mr. Dawson:—

"The strip of broken country embraced under that name, from where it crosses the boundary line to Elbow of South Saskatchewan, has an area of about 7,500 square miles, of which the greater part must always remain unsuited to agriculture, from its tumultuous and stony character, but would be, however, an excellent stock-raising district; though some of the steeper hills are scantily clothed with vegetation, a good growth of short nutritious grass covers most of the surface. Swamps with excellent hay grass are scattered everywhere.

"In its physical features the Côteau resembles Turtle Mountain, and like that place would no doubt be thickly wooded but for prairie fires. The want of wood is one of the most serious drawbacks. Animals fed on these hills during summer would require to be wintered in some of the river valleys to the north, or in wooded ravines of Tertiary plateau to the south."

Mr. Dawson, in referring to the alkaline lakes of the Côteau, gives an analysis of their water, and states that "a small quantity of this saline matter or alkali, is not found to be injurious to crops in Western States, where sufficient moisture exists; nor does it appear to be detrimental to the growth of grass."

Bell, Geo. Rep., 1873 *and* 1874, *pp.* 80, 76 *and* 79.

From Dirt Hills towards the Qu'Appelle.—The first 40 miles was over a swelling, clayey prairie with rough fissured, hummocky surface, and only one strip of wood along a creek.

The Dirt Hills are a conspicuous north-eastern projection of a range of hills extending from Old Wife's Lakes to Long River (branch of the Souris), and forming a sudden rise from the prairie lying towards the Assiniboine River.

"This rise or Côteau consists, in reality, of the ruins of an escarpment. To the south the country is extremely hilly, interspersed with ponds and small lakes of fresh and bitter water, and destitute of wood. The hills appear to be composed of gravelly earth, with boulders resting upon clays, similar to those last described. The grass is short and sparse, and occasionaly, for miles, the surface consists of almost bare gravel and boulders."

The highest point of Dirt Hill is 600 feet above plain immediately to north. Four seams of lignite crop out in lower half of the "middle bluff, of six, four, three and five feet respectively." "Nodules of sandstone and clay ironstone are found at base of hill."

From the Dirt Hill, toward Wood Mountain, $\frac{49}{105}$—"the whole country is extremely rough, and the hills for the first eight or nine miles are particularly steep, with numerous ponds of fresh water;" thence general descent to a strip of country in a somewhat lower level, but also very hilly, having a chain of dry salt lakes.

Col. MacLeod

Travelled along the boundary trail, and describes it through this section as prairie, with poor soil and pasturage.

$\frac{49}{105}$ *Dawson G. and R. of 49th parallel*, 1875, *p.* 293.

The great Plateau of the Lignite Tertiary occupies a large portion of the southern half of this section, and is described by him as being south and west of the Côteau, beginning at 350 mile point or near 105th longitude and extending as a well-defined table-land as far as White Mud River, a distance of 115 miles in vicinity of the line. "Its form is very irregular, but its area may be about 12,000 square miles. The soil of this plateau appears, as a rule, to be of a fertile character, but the indications are that, except in a few favoured spots, the rain fall is too small for growth of ordinary crops. Its elevation also, no doubt, renders it more subject to early and late frosts than prairie to the east, though the winter is probably not so severe as Red River Valley."

"The plateau of the tertiary is for the most part only adapted for pastoral occupation; but being covered with a good growth of grass is well suited for this use."

The strip of country between the plateau and southern edge of the Côteau partakes, in some measure, of of its character, but has a less favourable appearance.

An important advantage of this plateau, is the existence, on its edges, of sheltered valleys containing groves of poplar, and also the presence beneath it of great deposits of lignite coal.

In one of these sheltered valleys a Half-breed settlement known as "Wood Mountain" is situated $\frac{49}{106}$; no cultivation of the ground has been attempted, and is now only used by some hunters and traders for wintering shanties.

Bell, Geol. Rep., 1873–74, *p.* 79.

Prof. Bell passed through centre of this section from east to west.

The country is similar to that described south of Dirt Hills in previous section $\frac{49}{104}$, being also very hilly and having a chain of dry salt lakes. Only two regular valleys crossed before reaching the long, narrow Saline Lake at the base of Woody Mountains, one thirty, the other forty miles from Dirt Hills. He also crossed the north-east corner of section, and found the surface generally of rolling character. The soil in valleys and more level parts appeared to be derived from clays; pieces of clay ironstone found on surface. The higher grounds are occupied by a gravelly earth and boulders, ground broken up by sun cracks, rendering it hummocky and difficult to travel over it with carts.

Col. MacLeod

Also crossed south-west corner, and describes it as "prairie with poor soil producing pasture."

$\frac{49}{106}$ *Dawson's G. & R. of 49th parallel*, 1875, *p.* 294.

SOUTH OF PLATEAU, AS FAR WEST AS WOOD MOUNTAIN.

"The region draining to the Missouri is based on the Tertiary and generally bears a close short growth of grass. Beyond Wood Mountain the low ground both to the north and south of the plateau is based on the Cretaceous clays, and is in most places dry and barren." "The drier slopes which are scarcely capable of supporting a sod, show among the stunted grass a small species of lichen, and many peculiar Southern or extreme Western plants were here met with for the first time."

The first part of the above description applies to the south-eastern portion of this section, the Cretaceous clays occupy the south-western corner, and a strip on the western side to the north of the Tertiary plateau, which spreads over the remainder south and west of the Côteau. For description of Tertiary plateau, see sec. $\frac{49}{105}$.

THE WOOD MOUNTAINS are situated a little to south of centre of this section.

Bell's Geol. Rep., *p.* 79.

"The Woody Mountains consist of a rather bold north facing escarpment of arenaceous clays and soft sandstones, with beds of lignite." The escarpment is about 200 feet high.

"In one of the bluffs, eight apparently distinct beds of lignite were discovered. They are separated from each other by almost equal thicknesses of marly strata," the two central seams eight and five feet thick, the others from one to four feet. "The lignite of all the beds appears to be good quality;" "besides nodules of clay ironstone, a bed of this mineral 8 or 9 inches thick was observed near bottom of the bluff, and a thinner one about half way up."

Col. MacLeod.

States that "about Wood Mountain there are also some valleys which produce good grass." The country here "is chiefly valuable for grazing purposes, but I am of opinion that hay would have to be laid up for wintering stock." He also passed over country between Wood Mountain and Old Woman's Lakes, and thence along the northern portion of section and describes it as a prairie of fair soil with pasture, and that part lying to north-west of Wood Mountain, he states, is a poor sandy soil, but producing some pasture.

$\frac{49}{107}$ *Dawson, G. & R. of 49th parallel*, 1875, *p.* 295.

The Southern portion of section is occupied by the Cretaceous formation (see $\frac{49}{106}$), and the central by the Lignite Tertiary (see $\frac{49}{105}$.)

"West of White Mud River an undulating prairie is passed over, resembling in its vegetation the surface of Tertiary plateau. It is deeply drift covered."

Col. MacLeod.

"Passed over central part from Old Wife's Creek to boundary line, and thence diagonally across south-west corner, and describes it a prairie of poor soil, but producing pasture."

Mr. Ogilvie,

Who passed over the northern portion of this section during 1878, north of Old Wife's Creek, states that "its waters are fresh, and in the valley the soil is generally good, but no timber. The country outside the valley is a rolling prairie, sometimes rising into high gravelly knolls. Most of the flats are good soil and everywhere there is good grass, but very little water, most of it alkaline."

$\frac{49}{108}$ *Dawson, G. & R. of 49th parallel*, 1875, *p.* 295.

The south-east corner is covered by the Cretaceous formation as described in section $\frac{49}{106}$, which extends along the Boundary line for about 16 miles. "Beyond this point an outlying portion of Tertiary plateau stretches for 30 miles. It is much cut up by ravines and sometimes very stony, but is covered in general by a close sod, with few swamps producing good grass."

Col. MacLeod

Passed diagonally from north-west to south-east through this section, and describes it as prairie of poor soil, but producing some pasture.

Mr. Ogilvie

Travelled across northern portion. His description given in section $\frac{49}{107}$ applies to this also.

$\frac{49}{109}$ *Dawson, G. & R. of 49th Parallel*, 1875, *p.* 295.

From the outlying plateau of the Tertiary described in section $\frac{49}{108}$, an arid plain stretches westward for 50 miles, or nearly to Milk River.

"It also extends far north-westward towards the Cypress Hills and appears to coalesce along their western front with a similar desert region, which, according to Palliser, extends to the north. It appears to be irremediably sterile and useless, being based on Cretaceous No. 4, and in great part composed of the debris of those rocks. In early spring it is evidently in many places wet, but in summer dry, hard and fissured and scarcely supporting a sod. It is traversed by the valleys of the East and West forks of Milk River, which rise in the vicinity of Cypress Hills, but both the main streams and their tributary coulées become nearly dry before the end of the summer."

The Cypress Hills extend into the northern portion of this section. See section $\frac{49}{110}$.

Col. MacLeod

Passed over the northern half and describes that portion among the Cypress Hills as of fine, fertile and fair soil, while the eastern side is a prairie of poor soil with light pasture.

Mr. Ogilvie

Also crossed from the Cypress Hills north-easterly. "For about 20 miles from East End Post the country is rough, the hills gravelly with many granite boulders, and the flats generally fine soil, with many hay meadows. The pasture everywhere good and the water generally fresh."

In approaching Old Wife's Creek the country becomes rolling prairie. See Mr. Ogilvie's description, section $\frac{49}{107}$.

"The valley of the White Mud River, running south-easterly out of the Cypress Hills, is about two miles wide and contains some fine lands, but very little timber on the part seen. I saw some exposures of Cretaceous sandstone on it, and about 12 miles east of 'East End Post' is exposed a seam of lignite coal about five feet thick, which I traced for several thousand feet."

$\frac{49}{110}$ *Dawson G. & R. of 49th parallel*, 1875, *pp.* 295 *&* 296.

For 20 miles along boundary and stretching north to base of Cypress Hills, a arid plain. See section $\frac{49}{109}$.

"The western limit of this plain is formed by a strip of more elevated land lying between it and the Milk River, and about five miles wide. This is again based on the Lignite Tertiary formation and shows an uniform short sod, with some lakes and swamps, surrounded with fine hay grass, along its eastern border."

Westward from Milk River, the infertile Cretaceous clays do not recur the country being based on the Lignite Tertiary.

To the base of the East Butte the surface, though not of the same desert character as that east of Milk River, is covered by a short thin sod only, and is in many places stony also.

The unfavourable appearance of all this region does not arise so much from any deficiency in the soil itself as from the absence of sufficient moisture, which is derived only from melting snow and spring rains.

Palliser, Exp. pp. 141 *&* 142.

Describes the country to north of the Cypress Hills in this section as a most desolate looking country, without either grass or water. On approaching the hills, some rocky gullies were crossed in one of which was found a good deal of maple, at the commencement of the ascent a small lake was passed, where there was excellent grass, but no wood.

Cypress Hills.—"These hills are a perfect oasis in the desert we have travelled, they connect with the high hills near the Elbow of South Branch of the Saskatchewan, but at this point they terminate to the west and are separated from the Rocky Mountains by a wide tract of arid country." They are 3,800 feet above the sea, and are covered with timber (such as pine, spruce, maple, &c., occurring in the valley), much of which is valuable for building purposes. The soil is rich and pasture fine in the hollows, and the supply of water abundant. There is also a great abundance of game and wild fruit in the valleys.

Ascended into the heart of the Cypress Mountains to a magnificent valley running through them. In this valley is a height of land from which the waters shed off both into the Missouri and into the Saskatchewan.

Col. MacLeod

Describes the Cypress Hills as a succession of high plateaux running for about 100 miles east and west, cut into by small streams, which have formed large steep coulées of irregular width through the hills. There is an abundance of good luxuriant grass to be found in all directions, as well as excellent water, also a good supply of pine. He is of opinion that the Cypress and Wood Hills are both of them principally valuable for grazing purposes, but that hay would have to be laid up for wintering stock.

The country to south of hills is of poor quality, but furnishing sufficient grass for horses and cattle passing through, with water varying with the season.

Capt. Clark

States that although cattle and horses graze out during the winter in the Cypress Hills, they do not thrive as well as those in the McLeod and Bow Rivers country, owing to the severe storms that sweep through these hills. "Coal is to be found in them and on a stream a few miles to the west. The grass throughout these hills is excellent, and water abundant, clear sparkling streams running in every direction, a good deal of pine is also found in them. To the south the country becomes barren and the further south the more barren. This is known as the Milk River District."

Mr. Ogilvie

Describes the country to the west of Cypress Hills, as generally gravelly, and in some places rather sandy, very little water and that mostly alkaline, also very little wood. Coal is revealed in some of the ravines which run into the Saskatchewan. The Cypress Hills rise abruptly to a height of 700 or 800 feet above the plains; on these hills are many large patches of a kind of pine, here called Cypress which possesses little value except for fuel, also some tamarac, but too small except for fencing purposes. The soil on the top of the hills is generally of a gravelly loam, supporting good grass. He was informed that there was here a large Settlement of Half-breeds, possessing herds of cattle, who thought the hills excellent pasture.

49

III The Three Buttes, although in American territory, the boundary line touching the base of the western one, form a most prominent feature of this part of the country. They rise according to—

Dawson, G. & R., of 49th parallel. 1875, *pp.* 296 *and* 297.

3,000 feet above the plain. "Their height and mass being sufficient to cause the formation and arrest of clouds in their immediate vicinity, where rainfall is consequently much more copious."

"From Sweet Grass Hills, toward the Rocky Mountains the country improves in appearance and shows evidence of greater rainfall. The cactus, grease-wood and Artemisia cease to appear. To the second branch of Milk River, a distance of 55 miles, the country is generally much broken." "There is usually a close thick growth of grass; the swamps and sloughs, which are numerous, generally hold grasses and Carices to the exclusion of rushes, formerly most abundant.

"The watershed region from second branch of Milk River to the St. Mary River is of a similar character."

Palliser Exp., p. 143 (Dr. Hector's Journey).

Cypress Hills to forks of South Saskatchewan and Belly Rivers.—Across the northern portion of this section water only occurs as pools in the beds of the creeks, and is of a very bad quality. Crossed range of hills that run to north-east and deep ravine in which was no water, and then over high rolling prairies, obtaining a fine view of Les Trois Buttes. "Although the grass in these high plains is a little better than that in the chalky soil we had passed over, we could see no trace of water except in a little swampy pool with good grass round the edge."

Struck the South Saskatchewan 20 miles below the fork of the Bow and Belly Rivers. The banks are 210 feet high and very steep; could only see one clump of poplar on the margin; along the river are large flats. The banks are composed of bands of clays, covered with drift and boulders. Ascending the banks, crossed some sand hills and at noon reached the point where the Belly River joins the South Saskatchewan. "We crossed Belly River two miles above its mouth, fording it with ease, whereas Capt. Palliser, with the rest of the party, in crossing 40 miles higher up stream, were obliged to swim their horses and make rafts. Stream at our crossing 90yds wide and water only up to the horses girths, but very rapid." The banks are high and steep, with large bluffs of poplars on right bank.

Palliser Expedition, p. 157.

From Cypress Hills toward the Belly River, across central and southern portions of this section.

"Leaving Cypress Hills we travelled along a sandy plain interspersed with a few insignificant swamps and pools, most of which were salt.

"Les Trois Buttes were 40 miles to the south, and from level nature of intervening country and detached structures of these hills, they appear like the tops of three distinct rocks seen over a sea horizon.

"Pursuing our course along the boundary line, came upon a large perfectly dry river bed, about 500 or 600 yards across. The waters from this singular river once flowed into the Missouri." Height of banks from 180 to 240 feet. "In bottom found small springs of excellent water. Lat. 49° 25' north."

Col. MacLeod

Crossed this section between the Cypress Hills and forks of the Belly and South Saskatchewan, and describes it as a poor soil, but affording sufficient grass for horses and cattle passing through, with water varying with the season.

Capt. Clark

Describes the country to the west of Cypress Hills through this section as a rolling prairie, with good grass, but, at certain dry seasons, very little water.

Mr. Ogilvie.

Passed across centre of this section and found the soil generally gravelly, and in some places sandy; very little water, which is mostly alkaline, and wood scarce.

Col. MacLeod.

"What is called the 'barren lands' of the United States extend into the North-West Territories forming a triangle of which, speaking roughly, the Boundary line, commencing about forty miles from the Mountains, and extending to the Grand Côteau of the Souris, forms the base, a line drawn from there to the 'Elbow' of the Saskatchewan, a little south of the 50th parallel and north-west of Fort Walsh, a side, and a line drawn from the last-mentioned point to the place of beginning the other side; this last line will not include however, some of the poor land which exists to the west of it. Throughout the whole of this triangle sufficient grass is to be found for horses and cattle passing through, with water varying with the season."

The above extract refers to sections $\frac{49}{103}$, $\frac{49}{104}$, $\frac{49}{105}$, $\frac{49}{106}$, $\frac{49}{107}$, $\frac{49}{108}$, $\frac{49}{109}$, $\frac{49}{110}$, $\frac{49}{111}$ and a portion of $\frac{49}{112}$.

$\frac{49}{112}$ For Mr. Dawson's description of southern part, see section $\frac{49}{111}$.

Palliser Expedition, p. 144,

Passed across north-east corner of section.—

"At Belly River, section showed sandstone clays, with lignite, resting on dark-brown sandy clays."

The country since leaving Belly River was very arid; the rain falling on the hard-baked clay soil at once evaporated.

Palliser Expedition, p. 157,

Passed across central portion.—

"We had now traversed the level and plain through which the 49th parallel runs, and had suffered a good deal from the scarcity of good water and grass. The few small swamps and marshes were all more or less impregnated with sulphates, and the grass in their neighbourhood scarcely sufficed to feed our horses." In the evening of 9th August, arrived at tributary of Belly River. Lat. at noon 49° 44″.

Col. MacLeod.

The Eastern portion is similar to section $\frac{49}{111}$, but an improvement begins towards the west.

Capt. Clark and *Mr. Ogilvie*, agree in this.

$\frac{49}{113}$ *Dawson's G. & R. of 49th parallel,* 1875, *pp.* 297, 298.

The water-shed region from second branch of Milk River to St. Mary's River is similar to that previously described. See section $\frac{49}{111}$.

"The portion of fertile belt fringing eastern side of the Rocky Mountains, in the neighbourhood of 49th parallel, is about 25 miles in width. On crossing St. Mary's River a very marked and rather sudden change for the better is observed; the surface at the same time becomes more undulating and broken, and is quite hilly before the actual base of the Mountains is reached; it is now covered with a thick vegetable soil supporting a luxuriant growth of grass, and, wherever the fire has spared them, trees are to be found in all stages of growth. Many plants last seen in the neighbourhood of Pembina Mountains and the Red River Valley, and which across the more arid plains have been lurking in sheltered hollows and damp coulées, now reappear over the surface of the country generally. The rivers and streams also entirely changed their character, and, instead of flowing sluggishly with a milky opacity, now hold clear blue water, run swiftly over stony and gravelly beds, and are filled with trout. The thickets are generally of poplar, but in the immediate vicinity of the Mountains show birch and coniferous trees also."

"I was informed by traders who had wintered in the vicinity of St. Mary River, that the snow does not lie here for more than about three months, the temperature also being much milder than further east. It would appear probable, however, from the altitude of the country, that early and late frosts may shorten the season, agriculturally, to a greater extent than indicated by the above statement."

"Buffalo are said to frequent the foot hills of the mountains in winter in great numbers." "For this part of the country the mountains form an inexhaustible source of wood for construction and fuel, though extensive areas are known to be underlaid by coal. The timber in the mountains is chiefly coniferous and not of large size, except in certain secluded valleys.

"A species of pine somewhat resembling the Banksian pine, but which I believe to be *Pinus contorta*, is found pretty abundantly in some localities, especially on the gravel terraces and valley bottoms; it would afford good straight timber, but does not obtain a great girth. The Douglas pine also occurs on both sides of the watershed, but is generally small.

"The largest timber observed was in some of the higher and more secluded valleys; the trees resembled the black spruce, but were probably *Abies Engelmanni*."

Palliser Exp., *p.* 158.

From Belly River to Rocky Mountains; "thence our course was to the northward in order to strike the entrance of the Kootanie Pass. The ground was much burned; the country was rich, undulating and grassy.

"We were now in the mountains; the carts had arrived at the last point which it was practicable for them to reach. The berries at this altitude of about 800 feet were still eatable, although past the season below. Latitude 49° 36′ north."

Palliser Exp., *p.* 91.

In journey of 1858 passed in a southerly course through the western portion of this section. Traversing along the western flank of the Porcupine Hills, crossed Old Man or Arrow River. The land to north of Little Belly River (latitude 49° 32′) was poor, flinty and sandy, but to the south greatly improved, and was in some places rich and pasturage good.

"OBSERVATION HILL—a little to the north-east of Chief Mountain—Ascended a road through the forest to a considerable height, when the hill became grassy and steep. "From the top we could trace feeders of the South Saskatchewan by their fringes of poplar and willow, or by their banks along the sandy waste." "All waters, after running a few miles to eastward, bore away to the northward. As far as the eye could reach to the north and east was an apparently boundless sandy plain."

Col. MacLeod,

Whose headquarters have been for some time at Fort McLeod, thus describes this and neighbouring sections:—"Commencing at the boundary line and running north to the head of Bow River, there is a tract of country varying in depth from thirty to fifty miles from the Rocky Mountains, which produces very good grass, and surpasses, I have been told, any of the stock-raising parts of Montana.

"Through this tract there is a large number of fine streams which, rise in the Rocky Mountains and, joining together at various points, form the South Saskatchewan. The bottoms of these streams and some of the valleys which lead from them are of considerable extent, being in some cases several miles wide. The soil is generally very good, and, as you near the mountains, excellent; good samples of wheat, oats, barley, peas and corn have been already produced. The yield and size of potatoes are very satisfactory, and other vegetables have been produced in abundance.

"The climate is very mild, and the snow-fall small, except close to the Mountains; cattle graze out all the winter.

"Good pine is found on the slopes of the Mountains and for some distance from their base, while *cotton wood* trees of good size grow all along the river 'bottoms.'"

"When the prairie is not burnt off, the country I am speaking of is a favourite haunt of buffalo. During the winter the Indians camp in the river bottoms, which afford them shelter and fuel, and sally forth now and then to procure their supplies of meat which, under the circumstances mentioned, is not hard to obtain."

Capt. Clark,

States that "the nearer one approaches to the Mountains the finer the soil becomes, the grass more luxuriant, and the climate more genial.

"The country about Macleod and right up to the Foot Hills of the Mountains may safely be termed an agricultural one, and indeed the success which has attended the few farmers and the police farm and gardens there, proves it to be such. The police garden at Macleod would be hard to beat in Ontario."

"The river bottoms are, as a rule, very large and well stocked with cotton wood. Pine grows in large quantities in the Foot Hills."

Mr. Ogilvie,

Entered this section from the north towards *Fort Macleod*, and thence travelled eastward; and describes the country to the north of Fort Macleod as a fine fertile land.

"Near Fort Macleod there is another high gravel ridge.

"On Old Man's River there are some patches of poplar, but too sparse to be of any use to settlers.

"From Fort Macleod to Belly River, about 8 miles, the soil is generally of fair quality.

"At *Belly River* I got a sample of wheat which was sown on the 20th of May last, and being late did not get filling properly; but still it is as fine a specimen of wheat as one would wish to see. I also saw at the same place a cellar of potatoes which were certainly as good as any lot of the same quantity I have seen in the Ottawa District. There is little poplar on the river, and as it runs out of the Rocky Mountains I suppose timber for building purposes could be brought down from there. Coal for fuel is abundant along the river.

"From Belly River to St. Mary's, a distance of about 18 miles, the soil is generally fair, grass good; no water or timber.

"In St. Mary's River valley are some coal exposures, but little or no timber.

"From St. Mary's River eastward to Cypress Hills the road passes over alternate patches of gravelly soil and good black loamy clay for about 20 miles, when it gets generally light and gravelly; water alkaline."

$\frac{49}{114}$ *Palliser, p.* 158.

Capt. Palliser traversed this section westerly through the Kootanie Pass, and the following extracts from his journal describe this part of his explorations:—

"Fell on the Kootanie track on the left bank of a small stream, a tributary to Moocoman River. On each side were steep, thickly wooded mountains, the undergrowth very dense. In the afternoon we crossed the flanking or Curtain range of the Rocky Mountains, about 2,000 feet above the level of the plains, and descended to a swampy well-wooded valley, and camped on one of the little tributaries of the Bow River.

"August 16th.—For first three and a-half hours through wood and swamps. Stopped to breakfast at base of the last and most lofty ascent, that which I conceive to be the water-shed of the continent. Our path was zigzag through woods which became stunted as we obtained an increased altitude, and a little before sunset we reached the height of land, whence we saw the waters which descend to the Pacific. Here the view of the mountains, especially to the northward, was magnificent; we were now on a mass of mountain over 6,000 feet above the level of the sea, contemplating snow-clad masses in the north-west horizon of more than double that altitude."

The description of this, the British Kootanie Pass, is contained in journal of 1858, Capt Palliser having re-crossed the Rocky Mountains in the beginning of September, 1858, by that Pass, on returning to Edmonton from his exploration of the Kananaskis Pass.

Capt. Clark.

States that "several Montana miners have and are prospecting the Foot Hills of the Mountains. In the winter of 1878 one of these prospectors (term used in the west) showed a piece of metal which he claimed to have found when prospecting. I saw this piece of metal assayed in Helena, Montana, and it proved to be no less than pure tin. Time and patience can alone prove how vast are the mineral resources of that great country, and in the mean time there is no reason why it should not be one of the finest stock-raising countries in the world."

See also Col. MacLeod's and Capt. Clarks descriptions in $\frac{49}{113}$ and $\frac{50}{113}$.

APPENDIX No. 2.

A description of the several contracts entered into—with the rates and prices—for the supply of materials and execution of work on the Canadian Pacific Railway, since January, 1877, to the present time. A description of the contracts previously entered into, will be found in the Report of February, 1877, pages 383 to 396.

CONTRACT No. 5*a*.

PEMBINA BRANCH.—Extension from St. Boniface to Selkirk. Embracing all the works necessary in connection with the grading, bridging, track laying and ballasting. Length 21½ miles. Mr. Whitehead, was authorized under Order in Council dated 11th of May, 1877, to proceed with the work as part of his first contract, (Contract No. 5. See page 385 Report of 1877.) Earth excavation to be paid for at 22 cents per cubic yard, and the other works as per prices in Contract No. 15. (See page 390 Report of 1877.)

Name of contractor ....Joseph Whitehead.
Order in Council............................ ....May 11th, 1877.

The quantities of work proformed with the specified rates are as follows :—

Description of Works.	Quantities.			Rates.	Amount.
				$ cts.	$ cts.
Clearing	Acres	205·53	Per acre	30 00	6,165 90
Grubbing including side ditches	do	100·65	do	80 00	8,052 00
Fencing	L. feet	2,104·25	Per L. ft.	0 06	12,625 50
Loose rock	C. yds.	585	Per C. yd.	1 75	1,023 75
Earth excavation including borrowing	do	191,866	do	0 22	42,210 52
Excavation in off-take ditches beyond Railway limits	do	54,851	do	0 45	24,682 95
Earth excavation under water	do	185	do	0 66	122 10
Extra pane					326 77
Square timber 16 × 12 in	L. feet	1,608	Per L. ft.	0 33	530 64
do 12 × 12	do	20,053	do	0 30	6,015 90
do 12 × 9	do	5,718	do	0 28	1,601 04
do 12 × 8	do	574	do	0 28	160 72
do 9 × 8	do	6,901	do	0 25	1,725 25
do 6 × 4	do	2,490	do	0 20	498 00
Pine plank B.M.	S. feet	8,670	Per M.	25 00	216 75
Hardwood plank do	do	49,753	do	20 00	995 06
Wrought iron, including bolts, spikes, straps, &c.	Lbs.	8,296	Per lb.	0 13	1,078 48
Cast iron	do	2,647	do	0 10	264 70
Ties	No.	32,979	Per tie	0 40	13,191 60
Track laying	Miles.	22·75	Per mile	290 00	6,597 50
Ballasting	C. yds.	45,500	Per C. yd	0 33	15,015 00
Points and crossing	Sets.	2	Per set	10 00	20 00
Wages with 15 per cent added					897 62
Approximate amount					144,017 75

Amount paid on account of work executed............................$141,500

CONTRACT No. 32.

For 250 tons of Railway Spikes, delivered at Fort William and Duluth during season of navigation, 1877.

Name of Contractors..... ....Cooper, Fairman & Co.
Date of Contract.......................................12th May, 1877.
Date for completion......................................1st July, 1877.

	Tons.
At Fort William.........	50
At Duluth................	200

250 tons @ $54.95......... $13,737 50

This Contract has been completed.
Amount paid, $13,737.50.

CONTRACT No. 32*a*.

For building eight Station Houses between Sunshine Creek and English River. The houses to be used by the Engineering staff during the construction of the works.

Name of Contractors..................................LeMay & Blair.
Date of Contract...10th January, 1877.
Date for completion......................................
Amount of Contract...................................$23,409.

On the 10th July, 1877, instructions were given by the Department that the buildings west of Port Savanne should be discontinued, and the contractors paid for the work done and material delivered. The contract was therefore closed.

Amount paid, $17,730.45.

CONTRACT No. 33.

PEMBINA BRANCH (portion of).—For completing the grading, with all the track-laying, ballasting, &c., between St. Boniface and Emerson. Length, 63½ miles.

Name of Contractors...................................Kavanagh, Murphy & Upper.
Date of Contract...21st June, 1878.
Date for completion....................................1st December, 1879.

The approximate quantities furnished to Contractors, moneyed out at the Contract rates, are as follows:—

SCHEDULE OF QUANTITIES AND PRICES.

Description of Work.	Approximate Quantities.			Rates.	Amount.
				$ cts.	$ cts.
Clearing	Acres	100	Per acre	24 00	2,400 00
Close cutting	do	50	do	28 00	1,400 00
Grubbing, including side ditches and off-take drains	do	100	do	50 00	5,000 00
Fencing	L. feet	666,000	Per l. ft	0 05	33,300 00
Loose rock excavation	C. yds	100	Per c. yd	2 50	250 00
Earth excavation, including borrowing	do	140,000	do	0 25	35,000 00
Excavation in off-take ditches beyond railway limits	do	10,000	do	0 30	3,000 00
Under-drains	L. feet	1,000	P. l. ft.	0 25	250 00
Howe Truss Bridges, 100 feet clear	Spans	2	P. span.	3,000 00	6,000 00
do 80 do	do	1	do	2,500 00	2,500 00
do 60 do	do	1	do	1,750 00	1,750 00
Cribwork in abutments and piers of bridges, including timber and stone filling	C. yds	2,500	Per c. yd	3 50	8,750 00
Rip-rap	do	1,000	do	1 50	1,500 00
Bridge masonry, in hydraulic cement mortar	do	....	do	15 00	....
do common lime mortar, lipped with cement	do	....	do	15 00	....
Culvert masonry, in hydraulic cement mortar	do	....	do	12 00	....
do common lime mortar, lipped with cement	do	....	do	10 00	....
Culvert masonry, dry	do	....	do	8 00	....
Brickwork, in hydraulic cement mortar	do	....	do	12 50	....
do common lime mortar, lipped with cement	do	....	do	11 00	....
Concrete made with hydraulic cement	do	....	do	10 00	....
Clay puddle	do	....	do	2 00	....
Carried forward	....	....	....	....	101,100 00

SCHEDULE OF QUANTITIES AND PRICES.—*Concluded.*

Description of Work.	Approximate Quantities.			Rates.	Amount.
				$ cts.	$ cts.
Brought forward					101,100 00
Squared Timber in Trestle-work, Bridges, Culverts, &c.					
16 × 12 in., white pine	L. feet	2,500	Per l. ft	0 50	1,250 00
15 × 12 do	do	2,000	do	0 50	1,000 00
15 × 9 do	do	2,500	do	0 40	1,000 00
12 × 12 do or tamarac	do	38,000	do	0 35	13,300 00
12 × 9 do do	do	4,000	do	0 25	1,000 00
9 × 8 do do	do	14,000	do	0 18	2,520 00
12 × 12 may be spruce	do	15,000	do	0 35	5,250 00
12 × 9 do	do	7,000	do	0 25	1,750 00
12 × 6 do	do	1,500	do	0 18	270 00
12 × 4 do	do	1,000	do	0 12	120 00
9 × 9 do	do	500	do	0 21	105 00
9 × 6 do	do	4,000	do	0 15	600 00
9 × 4 do	do	1,000	do	0 10	100 00
6 × 4 do	do	1,000	do	0 10	100 00
4 × 3 oak scantling	do	500	do	0 03½	17 50
[illegible] inches flatted timber, may be spruce	do	22,000	do	0 15	3,300 00
do do do	do	10,000	do	0 10	1,000 00
Piles, tamarac or oak, of size to square 12 inches at large end	do	2,500	do	0 40	1,000 00
Hemlock or spruce plank b. m.	S. feet	1,000	Per M	20 00	20 00
Pine plank b. m.	do	110,000	do	25 00	2,750 00
Hardwood plank b. m.	do	1,000	do	50 00	50 00
Wrought iron, including bolts, spikes, straps, &c.	Lbs.	25,000	Per lb.	0 10	2,500 00
Cast iron	do	8,500	do	0 10	850 00
Track laying	Miles	66	Per mile	250 00	16,500 00
Ballasting	C. yds	110,000	Per c. yd	0 27	29,700 00
Points and crossing	Sets	20	Per set	25 00	500 00
Approximate amount of contract					187,652 50

Amount paid on account of work executed.................. $54,100 00

By Order in Council, dated October, 1878, it was directed that in consideration of the Contractors so expediting the works by the erection of temporary bridging and otherwise, as to admit of the passage of slow trains before the end of the year, and for afterwards completing the works in terms of the contract, they should be paid the sum of $15,000. The track was laid and trains passed over the line on the December

CONTRACT No. 34.

For transportation of rails, fish-plates, bolts, &c., from Kingston, Ont., to St. Boniface, Manitoba, and from Fort William, Lake Superior, to Emerson, Manitoba, including all labour and charges:—

Name of contractor..................North-West Transportation Company.
Dates of contract....................May 29th and September 30th, 1878.
Dates for delivery...................September 15th, 1878, and summer of 1879.

From Kingston,	4,500 tons at $18 per ton...............	$81,000
From Fort William,	1,500 do do	27,000
	Estimated cost..	$108,000

Amount paid on account, $41,100.00.

CONTRACT No. 35.

For 480 tons of railway spikes delivered on the wharves at Fort William and Duluth:—

Name of contractor ....Cooper, Fairman & Co.
Date of contract,..................................June 3rd, 1878.
Date for delivery,....................................during navigation, 1878.

At Fort William	135 tons, 2,240 lbs.	
At Duluth (for Manitoba)	345 do	
	480 tons at $49.75 per ton.......	$23,880

This Contract has been completed.
Amount paid, $23,880.

CONTRACT No. 36.

For 165,000 railway ties for the Pembina Branch, to be delivered as follows:— 75,000 at St. Boniface; 60,000 at Rat River, and 30,000 at Rosseau River.

Name of contractor .... William Robinson.
Date of contract.....................................February 22nd, 1878.
Date for completion............. ....June 30th, 1878.
Estimated cost, 165,000, at $0.44 per tie.......$72,600

On the 29th October the contractor had only delivered 86,868 ties, and, as the track-laying of the Pembina Branch was being delayed in consequence, the contract was taken out of the contractor's hands, and a sufficient quantity furnished by the Department at his expense.

Total number delivered, 157,943, value at contract rate, $69,494.92.
Amount paid on account, $35,016.08.

CONTRACT No. 37.

GEORGIAN BAY BRANCH—Extending from South River, near Lake Nipissing to Cantin's Bay or French River. The contract embraces all the works necessary in connection with the grading, bridging, tracklaying, and ballasting, according to General specification. Length 50 miles.

Name of contractors,........................Heney, Charlebois & Flood.
Date of contract........ ....August 2nd, 1878.
Date for completion...........................July 1st, 1880.

The approximate quantities furnished to contractors moneyed out at the contract rates are as follows:—

SCHEDULE OF QUANTITIES AND PRICES.

Description of Work.	Approximate Quantities.			Rate.	Amount.
				$ cts.	$ cts.
Clearing	Acres	800	Per acre	40 00	32,000 00
Close cutting	do	15	do	60 00	900 00
Grubbing, including side ditches and off-take drains	do	50	do	1 50	7,500 00
Fencing	L. feet	50,000	Per L. ft	0 06	3,000 00
Solid Rock excavation	C. yds	185 000	Per C. yds	1 30	240,500 00
Loose do	do	3,000	do	0 60	1,800 00
Earth excavation, including borrowing	do	1,100,000	do	0 22	242,000 00
Excavation in off-take ditches, beyond railway limits	do	3,000	do	0 25	750 00
Under drains	L. feet	10,000	Per L. ft	0 20	2,000 00
Bridges, Iron superstructure 150 ft. clear	Spans	2	Per span	9,000 00	18,000 00
do do 100 do	do		do	5,000 00	
do do 80 do	do		do	3,700 00	
do do 60 do	do		do	2,580 00	
do do 40 do	do		do	1,400 00	
do Howe Truss 150 do	Span		do	4,990 00	
do do 100 do	do	1	do	2,376 00	2,376 00
do do 80 do	do		do	1,720 00	
do do 60 do	do	11	do	1,320 00	14,520 00
do do 40 do	do	1	do	880 00	880 00
Six-feet tunnels for streams (1 cubic yard per lineal foot)	L. feet		Per L. ft	4 00	
Cribwork in abutments and piers of bridges, including stone filling	C. yds		Per C. yd.	3 00	
Rip-rap	do	1,200	do	2 00	2,400 00
Bridge masonry, in hydraulic cement mortar	do	8,000	do	13 00	104,000 00
Bridge masonry, in common lime mortar, lipped with cement	do		do	12 00	
Culvert masonry, in hydraulic cement mortar	do		do	9 00	
Culvert masonry, in common lime mortar, lipped with cement	do	9,000	do	7 50	67,500 00
Culvert masonry, dry	do		do	6 50	
Brickwork, in hydraulic cement mortar	do		do	11 00	
do in common lime mortar, lipped with cement	do		do	10 00	
Concrete made with hydraulic cement	do	250	do	7 00	1,750 00
Clay puddle	do	250	do	1 50	375 00
Carried forward					742,251 00

SCHEDULE OF QUANTITIES AND PRICES.—*Concluded.*

Description of Work.	Approximate Quantities.			Rate.	Amount.
				$ cts.	$ cts.
Brought forward					742,251 00
Square Timber in Trestle-work, Culverts, Bridges, &c.					
16 × 12 in., white pine	L. feet	1,500	Per L. ft	0 30	450 00
15 × 12 do	do	500	do	0 30	150 00
15 × 9 do	do		do	0 25	
12 × 12 do or tamarac	do	200	do	0 20	40 00
12 × 9 do do	do		do	0 18	
12 × 6 do do	do		do	0 15	
12 × 4 do do	do		do	0 10	
9 × 9 do do	do		do	0 12	
9 × 8 do do	do		do	0 12	
9 × 6 do do	do		do	0 10	
9 × 4 do do	do		do	0 10	
6 × 4 do do	do		do	0 08	
4 × 2 oak scantling	do		do	0 15	
Flatted timber, 10 inches	do		do	0 10	
do 8 do	do		do	0 06	
Piles, tamarac or oak, of size to square 12 inches at large end	do		do	0 40	
Pine plank b. m	S. feet	20,000	Per M	15 00	300 00
Hardwood plank b. m	do	1,000	do	40 00	40 00
Wrought iron, including bolts, spikes, straps, &c	Lbs	2,000	Per lb.	0 10	200 00
Cast iron	do	200	do	0 06	12 00
Ties	No.	125,000	Per tie	0 15	18,750 00
Track-laying	Miles	52	Per mile	250 00	13,000 00
Ballasting	C. yds.	156,000	Per C. yd.	0 22	34,320 00
Points and crossings	Sets	30	Per set	10 00	300 00
Approximate amount of contract					809,813 00

Amount paid on account of work executed..........................$1,400.

CONTRACT No. 38.

For converting the Neebing Hotel at Fort William into offices for the Engineering staff, Prince Arthur District, including all labour and materials, according to plans and specification.

Name of Contractor..............................Edmond Ingalls.
Date of Contract..............................July 26th, 1878.
Date for completion..............................26th September, 1878.

Estimated amount of contract, $3,261.00.
This contract has been completed.
Amount paid, $3,456.85.

CONTRACT No. 39.

For transportation of rails from Esquimalt and Nanaimo to Yale, British Columbia, including all labour and charges.

Name of Contractor................................John Irving.
Date of contract..July 18th, 1878.
Date for completion....................................November 1st, 1878.

Estimated amount of contract:—
5,266 Imperial tons, or
5,898 tons of 2,000 lbs., at $6.44 .... $37,983 12

On expiry of the term of contract, the work was suspended by order of the Department, at which date 3,484 tons had been removed from Esquimalt, and 100 tons from Nanaimo. About 2,000 tons have been delivered and piled at Yale, and the balance remain at Langley and New Westminster.

Amount paid on account...$9,660.

CONTRACT No. 40.

For Engine-house at Selkirk, embracing all kinds of labour, materials and plant necessary for the due execution and completion of a ten-stall engine-house, according to plans and specification.

Name of Contractors .... .Gouin, Murphy & Upper.
Date of contract.....................................August 5th, 1878.
Date for completion................................September 1st, 1879.
Contract amount, lump sum.................................... ....$30,500

Should it prove necessary to carry the foundations to a greater depth than is specified and shewn on the drawings, or to extend the drain beyond 100 feet from the building, the following rates to be paid for the additional work:—

Excavation in foundations,	earth—	per cubic yard	$0	25
do do	rock	do	1	50
Masonry in foundations		do	5	00
Extension of drain, including excavation, building and refilling, per lineal yard			5	00

Operations had not commenced at end of 1878.

CONTRACT No. 41.

MAIN LINE.—Extending from English River to Eagle River. The contract embraces all the works necessary in connection with the excavation, grading, bridging, tracklaying and ballasting, according to General specification. Length 118 miles.

Name of contractors..Purcell & Co.
Date of contract ... .March 7th, 1879.
Date for completion....... ....July 1st, 1883.

It is, however, provided in the contract that should the works be so far completed as to be ready for the passage of through trains on the 1st day of July 1881, and the whole of the works be fully completed by the 1st day of July, 1882, the contractors are to be paid at the rates in the *second* column. The amount accruing from the increased prices to be paid in one sum on the work being satisfactorily completed within the short period.

The approximate quantities furnished to contractors, moneyed out at contract rates are as follows:—

SCHEDULE OF QUANTITIES AND PRICES.

Description of Work.	Approximate Quantities.			1st Column.		2nd Column.	
				To be completed by 1st July, 1883, and ready for passage of through trains by 1st July, 1882.		To be completed by 1st July, 1882, and ready for passage of through trains by 1st July, 1881.	
				Rates.	Amount.	Rates.	Amount.
				$ cts.	$	$ cts.	$
Clearing	Acres	470	Per acre	21 00	9,870	22 00	10,340
Close cutting	do	110	do	33 00	3,630	35 00	3,850
Grubbing	do	80	do	68 00	5,440	70 00	5,600
Platform of logs across muskegs, average 16 in. deep, covered with brush	do	30	do	175 00	5,250	180 00	5,400
Fencing	L. feet	41,000	Per L. ft	0 01	410	0 01	410
Solid rock excavation	C. yds	245,000	Per C. yd	1 50	367,500	1 55	379,750
Loose rock excavation	do	97,000	do	0 90	87,300	0 95	92,150
Earth excavation, including borrowing	do	4,830,000	do	0 25	1,207,500	0 26	1,255,800
Earth borrowing, with haul of 1 to 1¾ miles. (See 20th Clause of memo)	do	210,000	do	*0 10	21,000	*0 10	21,000
Off-take ditches, outside railway limits	do	3,000	do	0 25	750	0 26	780
Under-drains	L. feet	2,400	Per L. ft	0 33	792	0 35	840
Bridge masonry	C yds	1,100	Per C. yd	8 00	8,800	9 00	9,900
Culvert masonry	do	600	do	4 00	2,400	4 50	2,700
Paving	do	60	do	4 00	240	4 50	270
Concrete	do	300	do	1 00	300	1 00	300
Crib-work in abutment, and piers of bridges	do	22,000	do	3 00	66,000	3 50	77,000
Rip-rap	do	4,400	do	2 00	8,800	2 50	11,000
Cast-iron pipes, 3 ft. diameter inside, 1 in. thick, laid in concrete	L. feet	520	Per L. ft	3 50	1,820	4 00	2,080
Bridge superstructure, timber, 100 ft, in clear	Spans	3	Per span	3,600 00	10,800	3,700 00	11,100
Bridge superstructure, timber, 80 ft., in clear	do	8	do	3,000 00	24,000	3,200 00	25,600
Bridge superstructure, timber, 40 ft., in clear	do	14	do	1,000 00	14,000	1,200 00	16,800
Piles driven, 12 in. × 12 in	L. feet	18,500	Per L. ft	0 24	4,440	0 25	4,625
Carried forward							1,937,295

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* Previous to signing the contract it was pointed out by the Engineer-in-Chief that the price for earth borrowing, with haul from 1 to 1¾ miles was only 10 cents, while the rate should really be higher instead of lower than for ordinary excavation. He further pointed out that in preparing certificates as the work was executed, he could only money out the excavation under this item at the rate of 10 cents per cubic yard. In executing the contract, the parties thereto signed the following:—"We hereby acknowledge that the contract is entered into by us with a full understanding that the terms of the tender are to be adhered to, notwithstanding the circumstances above referred to."

SCHEDULE OF QUANTITIES AND PRICES.—*Concluded.*

Description of Work.	Approximate Quantities.			1st. Column.		2nd Column.	
				To be completed by 1st July, 1883, and ready for passage of through trains by 1st July, 1882.		To be completed by 1st July, 1882, and ready for passage of through trains by 1st July, 1881.	
				Rates.	Amount.	Rates.	Amount
				$ cts.	$	$ cts.	$
Brought forward	....	....	....	....	....	....	1,937,295
Square Timber in Trestle-work, Culverts, Bridges, &c.							
16 × 12 in., white pine............	do	14,000	do	0 38	5,320	0 40	5,600
16 × 10 do	do	700	do	0 35	245	0 38	266
14 × 12 do	do	400	do	0 35	140	0 38	152
12 × 12 do or tamarac	do	100,000	do	0 34	34,000	0 35	35,000
12 × 9 do do ...	do	12,000	do	0 29	3,480	0 30	3,600
12 × 8 do do ...	do	300	do	0 28	84	0 29	87
12 × 4 do do ...	do	1,700	do	0 23	391	0 24	408
9 × 8 do do ...	do	48,000	do	0 20	9,600	0 21	10,080
9 × 6 do do ...	do	34,000	do	0 20	6,800	0 21	7,140
9 × 4 do do ...	do	6,500	do	0 16	1,040	0 17	1,105
8 × 6 do do ...	do	300	do	0 16	48	0 17	51
8 in. flatted timber, white pine or tamarac...	do	4,400	do	0 18	792	0 20	880
Pine or tamarac plank..............	Ft. B.M	54,000	per M.	28 00	1,512	30 00	1,620
Hardwood plank	do	1,000	do	30 00	30	31 00	31
Wrought iron, including bolts, spikes, straps, &c...................	Lbs.	60,000	per lb.	0 08	4,800	0 08	4,800
Cast iron..............................	do	12,200	do	0 08	976	0 08	976
Ties...	No.	300,000	per tie	0 25	75,000	0 25	75,000
Carriage of rails and fastenings —average haul 172 miles	Tons	12,200	per ton	2 00	24,400	2 00	24,400
Track laying..............................	Miles	125	per mile	275 00	34,375	300 00	37,500
Ballasting	C. yds	437,500	pr. C.yd	0 34	148,750	0 35	153,125
Points and crossings	Sets	36	per set	29 00	1,044	30 00	1,080
Approximate amount of contract	....	....	....	....	2,203,896	....	2,300,196

Amount paid on account of work executed .... Nil.

Contract No. 42.

Main Line.—Extending from Eagle River—231 miles west of Fort William—to Keewatin, embracing all the works necessary in connection with the excavation, grading, bridging, track-laying and ballasting. Length 67 miles.

Name of Contractors..........................Fraser, Manning & Co.
Date of Contract..................................20th March, 1879.
Date for completion..............................1st July, 1883, and ready for passage of through trains by..............1st July, 1882.

The approximate quantities furnished to Contractors, moneyed out at contract rates, are as follows :—

SCHEDULE OF QUANTITIES AND PRICES.

Description of Work.	Approximate Quantities.			Rates.	Amount.
				$ cts.	$
Clearing	Acres	250	Per acre	25 00	6,250
Close cutting	do	30	do	35 00	1,050
Grubbing	do	150	do	75 00	11,250
Platform of logs across muskegs, average 16 inches deep, covered with brush	do	4	do	1,450 00	5,800
Fencing	L. feet	5,000	Per L. ft.	0 06	300
Solid rock excavation—line cuttings	C. yds.	900,000	Per C. yd.	1 85	1,665,000
Rock borrowing (see 19th clause of memo.)	do	426,000	do	2 00	852,000
Loose rock excavation	do	65,000	do	0 75	48,750
Earth excavation, ordinary (see 17th and 18th clauses of specification)	do	1,392,000	do	0 31	431,520
Extra earth borrowing—special rates, to cover cost of long haul as well as excavation (see 20th clause of memo.) when haul exceeds one mile—					
Between the 241st and 273rd miles	do	1,265,000	do	0 37	468,050
do 273rd and 289th do	do	385,000	do	0 35	134,750
do 293rd and 295th do	do	250,000	do	0 33	82,500
Off-take ditches, outside railway limits	do	12,000	do	0 50	6,000
Under-drains	L. feet	4,800	Per L. ft.	0 40	1,920
Stream tunnels, through rock, 8 feet diameter (two cubic yards per lineal foot)	do	1,250	do	18 00	22,500
Stream tunnels, through rock, 6 feet diameter (one cubic yard per lineal foot)	do	150	do	12 00	1,800
Bridge masonry	C. yds.	1,800	Per C. yd.	11 00	19,800
Culvert masonry	do	3,400	do	9 00	30,600
Paving	do	410	do	6 00	2,460
Concrete	do	200	do	6 00	1,200
Crib-work in abutments and piers of bridges.	do	1,300	do	4 00	5,200
Rip-rap	do	7,100	do	3 00	21,300
Cast-iron pipes, 3 feet diameter inside, 1 inch thick, laid in concrete	L. feet	660	Per L. ft.	50 00	33,000
Bridge superstructure, timber, 100 feet in clear	Spans	2	Per span	4,000 00	8,000
Piles driven, 12 × 12 in.	L. feet	28,000	Per L. ft.	0 30	8,400
Carried forward					3,869,400

SCHEDULE OF QUANTITIES AND PRICES.—*Concluded.*

Description of Work.	Approximate Quantities.			Rates	Amount.
				$ cts.	$
Brought forward........	....	....	....	....	3,869,400
Square Timber in Trestlework, Culverts, Bridges, &c.					
16 × 12 in., white pine....	L. feet	14,000	do	0 56	7,840
16 × 10 do	do	1,700	do	0 56	952
16 × 9 do	do	5,300	do	0 55	2,915
14 × 12 do	do	1,200	do	0 50	600
12 × 12 do or tamarac........	do	142,000	do	0 40	56,800
12 × 9 do do	do	8,000	do	0 35	2,800
12 × 6 do do	do	6,000	do	0 30	1,800
12 × 4 do do	do	1,300	do	0 20	260
9 × 8 do do	do	52,000	do	0 18	9,360
9 × 6 do do	do	54,000	do	0 16	8,640
9 × 4 do do	do	15,500	do	0 15	2,325
8 × 6 do do	do	300	do	0 15	45
6 × 4 do do	do	2,000	do	0 12	240
8 in. flatted timber, white pine or tamarac.........	do	2,000	do	0 15	300
Pine or tamarac plank........	Ft. B.M.	56,000	Per M.	40 00	2,240
Hardwood plank........	do	2,000	do	40 00	80
Wrought iron, including bolts, spikes, straps, &c.	Lbs.	103,000	Per lb.	0 10	10,300
Cast iron	do	40,000	do	0 09	3,600
Ties........	No.	168,000	Per tie	0 27	45,360
Carriage of rails and fastenings—average haul 190 miles........	Tons	6,800	Per ton	2 25	15,300
Track laying	Miles	70	Per mile	250 00	17,500
Ballasting........	C. yds.	245,000	Per C. yd.	0 29	71,050
Points and crossings.	Sets	20	Per set	50 00	1,000
Approximate amount of contract	....	....	....	....	4,130,707

Amount paid on account of work executed .... Nil.

Amount.
$
3,869,400
7,840
952
2,915
600
56,800
2,800
1,800
260
9,360
8,640
2,325
45
240
300
2,240
80
10,300
3,600
45,360
15,300
17,500
71,050
1,000
4,130,707

CANADIAN PACIFIC RAILWAY.

SUMMARY of Payments made on account of Work done up to 31st December, 1878, and approximate estimate of Expenditure involved.

No. of Contract.	Names of Contractors.	Amount paid.		Probable Amount involved.	
		$	cts.	$	cts.
1	Sifton, Glass & Co.	112,715	61	146,020	00
2	Richard Fuller	112,614	95	197,353	00
3	F. J. Barnard	38,700	00	413,217	00
4	Oliver, Davidson & Co	214,825	82	268,050	00
5	Joseph Whitehead	208,163	00	203,163	00
5a	Joseph Whitehead	141,500	00	148,000	00
6	Guest & Co.	280,558	76	280,558	76
7	Ebbw Vale Steel, Iron and Coal Co.	254,177	08	254,177	08
8	Mersey Steel and Iron Co.	1,065,842	29	1,065,842	29
9	West Cumberland Iron and Steel Co.	305,581	88	305,581	88
10	West Cumberland Iron and Steel Co.				
11	Naylor, Benson & Co.	265,052	36	265,052	36
12	Hon. A. B. Foster	41,000	00	41,000	00
13	Sifton & Ward	313.200	87	313,200	87
	Purcell & Ryan	18,778	64	18,778	64
14	Sifton & Ward	633,480	00	....	
	Joseph Whitehead (Completing Contract No. 14.)	....		75,000	00
15	Sutton, Thompson & Whitehead	1,052,700	00	....	
16	Canada Central Railway Co.	102,613	00	1,440,000	00
17	Anderson, Anderson & Co.	51,462	96	51,462	96
18	Red River Transportation Co.	213,928	24	218,550	00
19	Moses Chevrette	1,600	00	1,600	00
20	Merchants' Lake and River Steamship Co.	67,126	28	67,126	28
21	Patrick Kenny	8,782	11	8,782	11
22	Holcomb & Stewart	5,850	00	5,850	00
23	Sifton & Ward	14,648	14	14,648	14
24	Oliver, Davidson & Co.	3,525	10	3,525	10
	Carried forward	5,528,427	09	....	

Summary of Payments made on account of Work done up to 31st December, 1878, &c.—Canada Pacific Railway.—*Continued.*

No. of Contract.	Names of Contractors.	Amount paid.	Probable Amount involved.
		$ cts.	$ cts.
	Brought forward	5,528,427 09	....
25	Purcell & Ryan	1,247,800 00	1,400,000 00
26	James Isbester	35,431 00	35,431 00
27	Merchants' Lake and River Steamship Co	89,060 00	89,060 00
28	Red River Transportation Co	....	....
29	Cooper, Fairman & Co.	8,532 90	8,532 90
30	Robb & Co.	16,160 00	16,160 00
31	Patent Bolt and Nut Co	6,800 69	6,800 69
32	Cooper, Fairman & Co	13,737 50	13,737 50
32*a*	LeMay & Blair	17,730 45	17,730 45
33	Kavanagh, Murphy & Upper	54,100 00	187,652 50
34	North-West Transportation Co	41,100 00	108,000 00
35	Cooper, Fairman & Co	23,880 00	23,880 00
36	William Robinson	35,016 08	69,494 93
37	Heney, Charlebois & Flood	1,400 00	809,813 00
38	Edmond Ingalls	3,456 85	3,456 85
39	John Irving	9,660 00	....
40	Gouin, Murphy & Upper	....	30,500 00
41	Purcell & Co	....	2,300,196 00
42	Fraser, Manning & Co.	....	4,130,707 00
		7,132,292 56	
	Expenditure not under Contract.		
	Explorations, engineering surveys and supervision of construction	3,860,987 36	
	Miscellaneous payments, not under contract	545,586 63	
	Total ....$	11,538,866 55	

APPENDIX No. 3.

REPORT OF THE ENGINEER-IN-CHIEF ON SURVEYING OPERATIONS AND CONSTRUCTION FOR THE YEAR 1878.

CANADIAN PACIFIC RAILWAY.

OFFICE OF THE ENGINEER-IN-CHIEF,
OTTAWA, 8th January, 1879.

SIR,—I have the honor to present my annual report on the progress made in surveying operations and construction to the 31st December, 1878.

SURVEYS.

SURVEYS IN THE EASTERN OR WOODLAND REGION.

A revision of portions of the location between English River and Keewatin was made during the past summer with a view to a reduction of work, some parts of the distance, owing to the nature of the country, being unusually heavy. The object of the Survey has been in part accomplished, but it has been found impossible to avoid all the obstacles met, and in consequence very heavy works of excavation will have to be undertaken on the section extending easterly from Keewatin to Eagle River, 67 miles.

SURVEYS IN THE WESTERN OR MOUNTAIN REGION.

The operations in British Columbia during the past season were confined to a revision of the location between Emory's Bar, five miles below Yale, and the head of Kamloops Lake, by two parties.

The work on the portion from Emory's Bar to Spence's Bridge has resulted in an improvement in alignment and gradients, and a considerable saving in cost effected more especially in the large amount of protection and retaining walls shewn in the estimate of last year.

The surveys of the past year have established that the River Fraser can best be crossed about six miles below Lytton; this crossing is a mile and a-half above the point crossed by the previous survey, and considering the magnitude of the river and the extremely turbulent character of the current for a long distance, the crossing found is favorable. The bridge will consist of one main span of 300 feet with two side spans of 100 feet each. All the piers will be founded on the rocky banks of the chasm.

From Spence's Bridge to Kamloops Lake a material improvement has been made. The line, as previously located, involved a large amount of protection work. This has been avoided by throwing the line back from the river. The grades and alignment have also been improved and the distance reduced three-quarters of a mile.

A location survey has been made along the north side of Kamloops Lake, with a view to a comparison with the former location on the south side. This has resulted in shortening the line on this section three and a-half miles, in reducing the curvature 800 degrees, and in materially lessening the cost of the work. The deflection from the original line occurs at a point five miles below Savona's ferry and crosses the Thompson River with two spans of 200 feet.

WORKS OF CONSTRUCTION.

TELEGRAPH LINE.

The telegraph between Fort William and Selkirk, Red River, 410 miles, has been so far completed as to admit of it being used during a portion of the past year.

There is now a continuous line between Lake Superior and a point in the longitude of Edmonton, a distance of 1,197 miles. At present, however, it is only being operated as far as Battleford, 967 miles. There is also a branch telegraph in operation between Selkirk and Winnipeg, a distance of 22 miles.

In British Columbia about 80 miles of the telegraph is reported completed, ready for operating from Cache Creek, eastwards. The partial chopping and clearing of the line extends 25 miles further, being to a point 55 miles north of Kamloops.

GRADING, TRACKLAYING, ETC.

Fort William to English River, 113 *miles.*

The grading and bridging is sufficiently completed between the above-named points to admit of tracklaying. The rails have been laid to the 102nd mile. The ballasting is reported completed to the 60th mile, and is partially done for some distance beyond.

Keewatin to Cross Lake, 36 *miles.*

The work on this section is being prosecuted with considerable energy. Fully one-half of the rock excavation and a large quantity of earthwork has been done. The contractors have a large amount of plant and supplies on the ground, and there is every indication that the work will continue to be prosecuted vigorously.

Cross Lake to Selkirk, 76 *miles.*

The grading and bridging is completed on this section, with the exception of a short distance at the eastern end, embracing heavy embankments. Steam shovels, aided by locomotives and cars, are engaged upon this work, and it will be completed in the course of a few weeks. The rails have been laid for 75 miles east of Selkirk, and ballasting has been done in detached sections, equal in the aggregate to about 14 miles of completed line.

Pembina Branch, 85 *miles.*

The section between Selkirk and St. Boniface, 22 miles, has been completed, including tracklaying and ballasting. From St. Boniface to Emerson the grading has been completed and the rails laid, but temporary structures have been used for the river crossings. These structures will be replaced by others of a more permanent character ultimately. The line will be ballasted during next summer.

Subsidized Lines.

The Canada Central Railway extension is subsidized from Pembroke "to such point as may be selected by the Government as the terminus of the Canadian Pacific Railway, at or near the crossing of the Nipissing road at the south-east corner of Lake Nipissing." The subsidy is limited to $1,440,000. The distance from Pembroke to the crossing of the Nipissing road, the point named in the Order in Council, is estimated to be about 150 miles; 37 miles of this, commencing at Pembroke, have been located for construction; a location survey of the remainder has yet to be made. Of these thirty-seven miles, twenty-five miles are under construction, and a considerable portion of work done

Georgian Bay Branch, 50 miles.

A contract was entered into on the 2nd of August last for the grading, bridging, track-laying and ballasting required in constructing the line proposed to extend from a point on the western side of South River, near Nipissingan Post Office, to a point on French River about five miles east of Cantin's Bay, the distance being about fifty miles. The contractors have made some progress in erecting stores, and in forwarding supplies to points along the line, but construction so far has been confined to clearing portions of the line.

Engine House at Selkirk.

A contract has been entered into for the erection of a ten-stalled engine-house on the station grounds at Selkirk, but the building has not yet been commenced.

CONTRACTS.

A schedule of contracts upon which expenditure has been made during the fiscal year ended 30th June, 1878, is appended.

Tenders for New Sections.

The sections between English River and Keewatin (185 miles) and between Yale and Lake Kamloops (125 miles) have for some time been advertised for construction. The necessary papers for the former section are now being issued to intending contractors, and it is proposed to receive tenders before the end of January. This link of 185 miles placed under contract, the whole distance from Fort William, Lake Superior, to Selkirk in Manitoba, 410 miles, will be under construction. The terms of the proposed contract will, it is believed, secure a vigorous prosecution of the work, and the completion at the earliest day practicable of this important link in the Pacific Railway. The reception of tenders for the work between Yale and Lake Kamloops, in British Columbia, has been postponed.

Tenders for the Whole Line.

During the past summer advertisements were widely published in England and this country, inviting proposals from capitalists and contractors for constructing and operating the whole line from the Province of Ontario to the Pacific Coast, the distance being about 2,000 miles. All information was furnished on application, and tenders were to have been sent in by the first of this month. No offers within the required conditions have, however, been received.

I have the honour to be, Sir,
Your obedient servant,
SANDFORD FLEMING,
Engineer-in-Chief.

F. Braun, Esq.,
Secretary Public Works,
Ottawa.

Since the above was in type, one proposal for the whole line was opened on 30th January, 1879 when the tenders for the Sections, between English River and Keewatin, were opened.

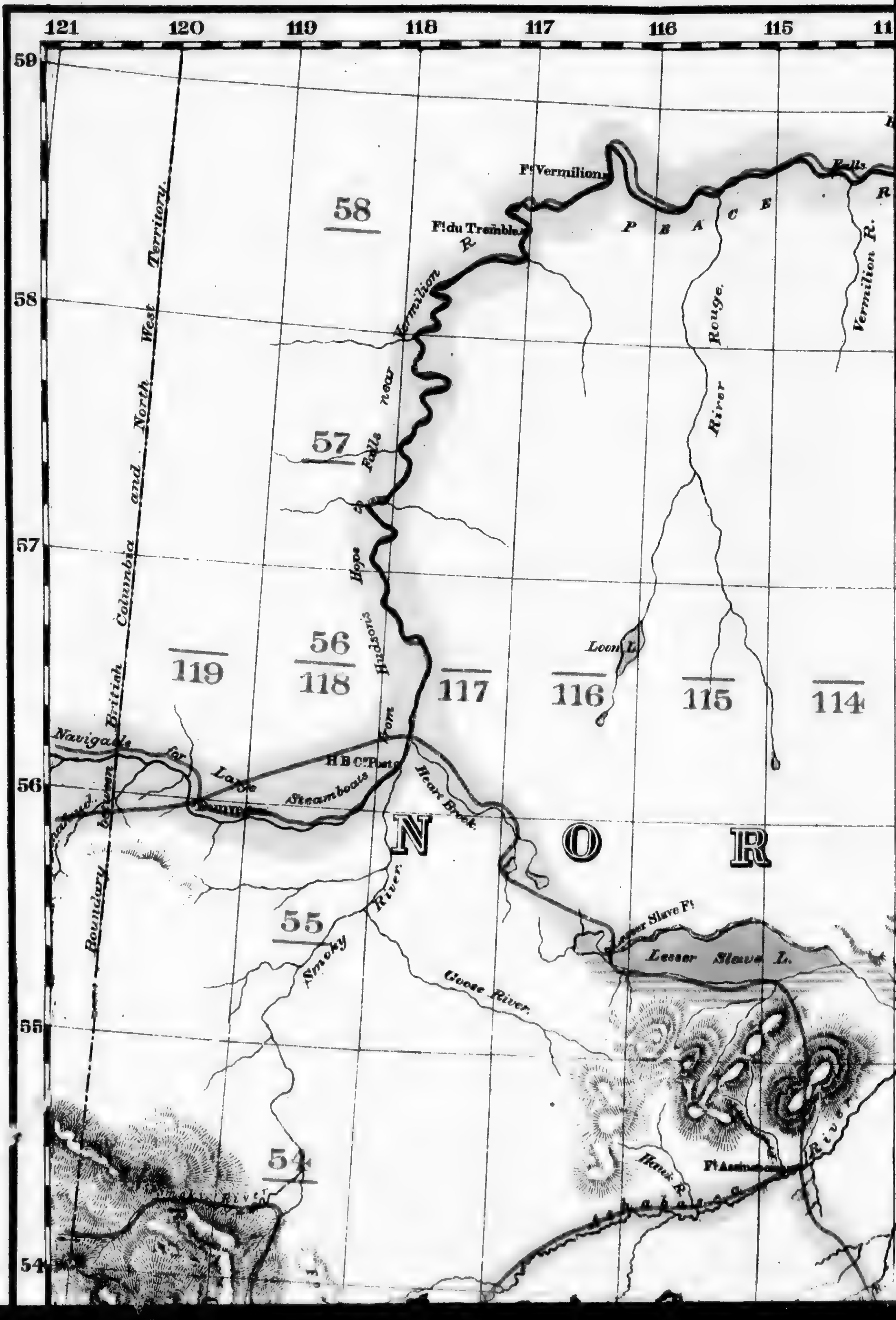
S. F.

CANADIAN PACIFIC RAILWAY.

SCHEDULE OF CONTRACTS with Statement of Expenditure upon the same, during the Fiscal Year ended 30th June, 1878.

Contract No.	Character of Works.	Date of Contract.	Name of Contractors.	Amount expended during Fiscal Year ended 30th June, 1878.
				$ cts.
1	Construction of Telegraph Line, Fort Garry to Livingstone	1874. Oct. 17	Sifton, Glass & Co.	5,655 93
2	do Livingstone to Edmonton	do 30	R. Fuller	3,250 00
3	do Edmonton to British Columbia	Nov. 10	F. J. Barnard	7,015 09
4	do Lake Superior to Fort Garry	1875. Feb. 19	Oliver, Davidson & Co	89,059 16
5a	Pembina Branch { Extension, St. Boniface to Selkirk, grading, bridging and track-laying }	1874. Aug. 31	Joseph Whitehead	100,610 00
13	Fort William to Sunshine Creek, grading and bridging	1875. April 3	Sifton & Ward	42,000 00
	do do completion grading, &c	1877. Aug. 29	Purcell & Ryan	13,700 00
14	Red River to Cross Lake, track-laying and bridging	1875. April 3	Sifton & Ward	250,750 00
15	{ Cross Lake to Rat Portage, grading and bridging Red River to Rat Portage, track-laying and ballasting }	1877. June 9	Sutton, Thompson & Whitehead.	532,200 00
25	{ Sunshine Creek to English River, grading and bridging Fort William to English River, track-laying and ballasting }	1876. June 6	Purcell & Ryan	687,600 00
26	Ten Stall Engine House, at Fort William	July 17	James Isbester	18,831 00
32a	Station Houses, between Fort William and English River		Lemay & Blair	17,730 45

25	Sunshine Creek to English River, grading and bridging Fort William to English River, track-laying and ballasting	June 6	Purcell & Ryan	687,600 00
26	Ten Stall Engine House, at Fort William	July 17	James Isbester	18,831 00
32a	Station Houses, between Fort William and English River		Lemay & Blair	17,730 45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Boundary between British Columbia and North West Territory.
F^t Vermilion
F^t du Tremble
Vermilion R.
P E A C E R
Falls
Rouge River
Vermilion R.
Falls near Hope to Hudsons from
Loon L.
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57
56
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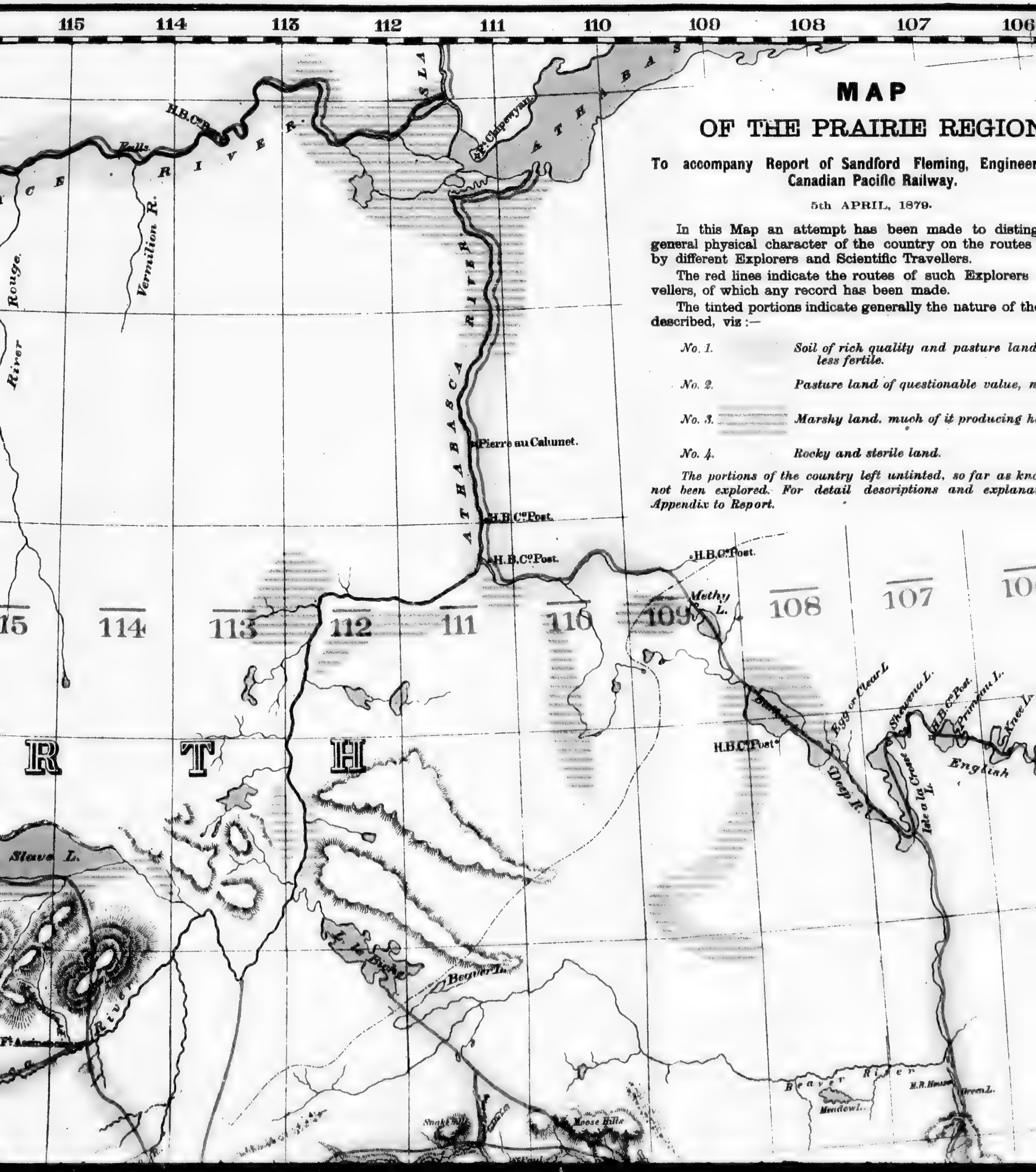
116
115
114
Navigable for Large Steamboats
H B C^o Posts
Heart Brook
N O R
Smoky River
Goose River
Lesser Slave F^t
Lesser Slave L.
F^t Assiniboine
Hawk R.
River
Smoky River



MAP
OF THE PRAIRIE REGION

To accompany Report of Sandford Fleming, Engineer
Canadian Pacific Railway.

5th APRIL, 1879.

In this Map an attempt has been made to disting
general physical character of the country on the routes
by different Explorers and Scientific Travellers.

The red lines indicate the routes of such Explorers
vellers, of which any record has been made.

The tinted portions indicate generally the nature of the
described, viz :—

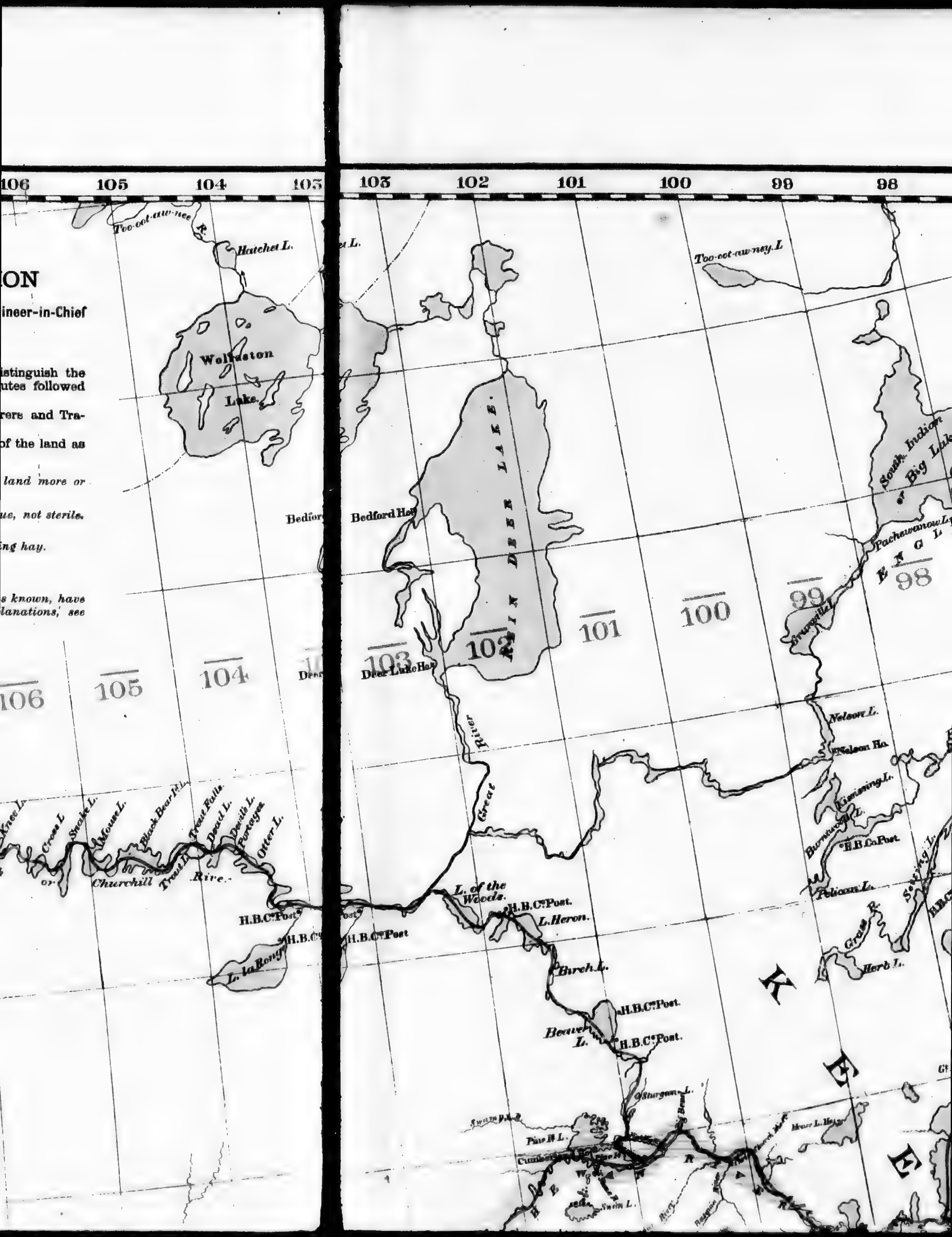
No. 1. *Soil of rich quality and pasture land*
less fertile.

No. 2. *Pasture land of questionable value, n*

No. 3. ▤ *Marshy land. much of it producing h*

No. 4. *Rocky and sterile land.*

The portions of the country left untinted, so far as kno
not been explored. For detail descriptions and explana
Appendix to Report.

106
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lanations, see
Too-oot-aw-nee R.
Hatchet L.
Wollaston Lake.
Too-oot-aw-ney L.
REIN DEER LAKE.
South Indian or Big Lake
Pachewanow L.
ENGL
Bedford Ho.
Deer Lake Ho.
Great River
Nelson L.
Nelson Ho.
Kississing L.
Burntwood L.
H.B.Co. Post
Pelican L.
Grass R.
Herb L.
Knee L.
Cross L.
Snake L.
Mouse L.
Black Bear I. L.
Trout Falls
Dead L.
Devil's L.
Portage
Otter L.
Churchill River
Trout L.
H.B.C. Post
L. la Ronge
L. of the Woods.
L. Heron.
Birch L.
Beaver L.
Sturgeon L.
Pine I. L.
Cumberland Ho.
K
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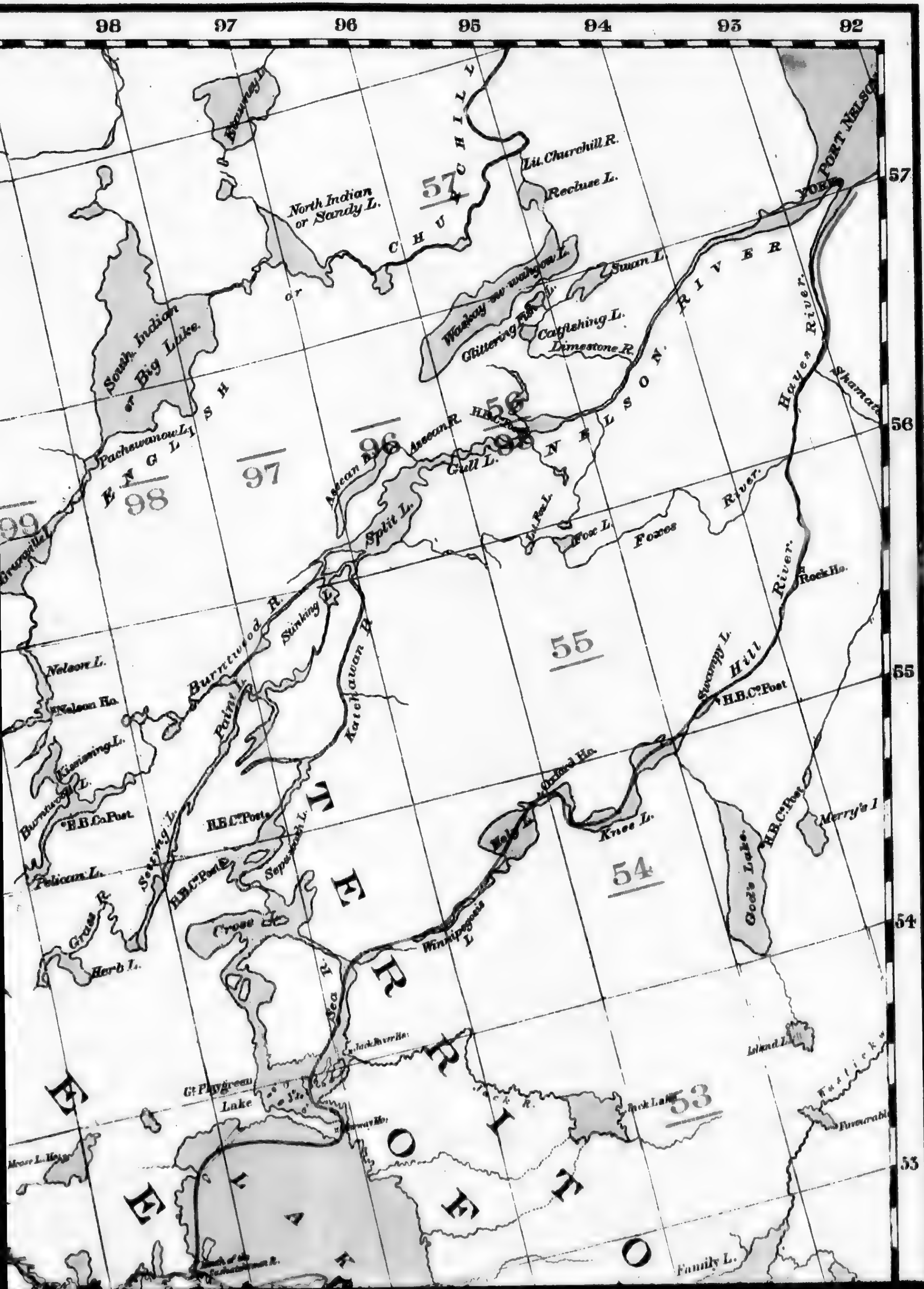
E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CHURCHILL or ENGLISH
Lit. Churchill R.
Reclusé L.
North Indian or Sandy L.
South Indian or Big Lake.
Pachewanou L.
Waskay we wahgow L.
Swan L.
Glittering Fish L.
Catfishing L.
Limestone R.
NELSON RIVER
YORK
PORT NELSON
Hayes River.
Shamatt
H.B.C.
Assean R.
Assean L.
Gull L.
Split L.
Fox L.
Foxes River.
Rock Ho.
River.
Hill
Swampy L.
H.B.C° Post
Oxford Ho.
Holy L.
Knee L.
God's Lake.
H.B.C° Post
Merry's I.
Burntwood R.
Stinking L.
Katchawan R.
Point
Nelson L.
Nelson Ho.
Kississing L.
Burntwood L.
H.B.C° Post
H.B.C° Posts
Setting L.
H.B.C° Post
Pelican L.
Grass R.
Herb L.
Cross L.
Winnipegosis L.
Sea R.
Jack River Ho.
Gt. Playgreen Lake
Norway Ho.
Jack R.
Jack Lake
Island L.
Favourable
Family L.
Moose L. Ho.
TERRITORY
KEEWATIN
LAKE
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Burntwood L.
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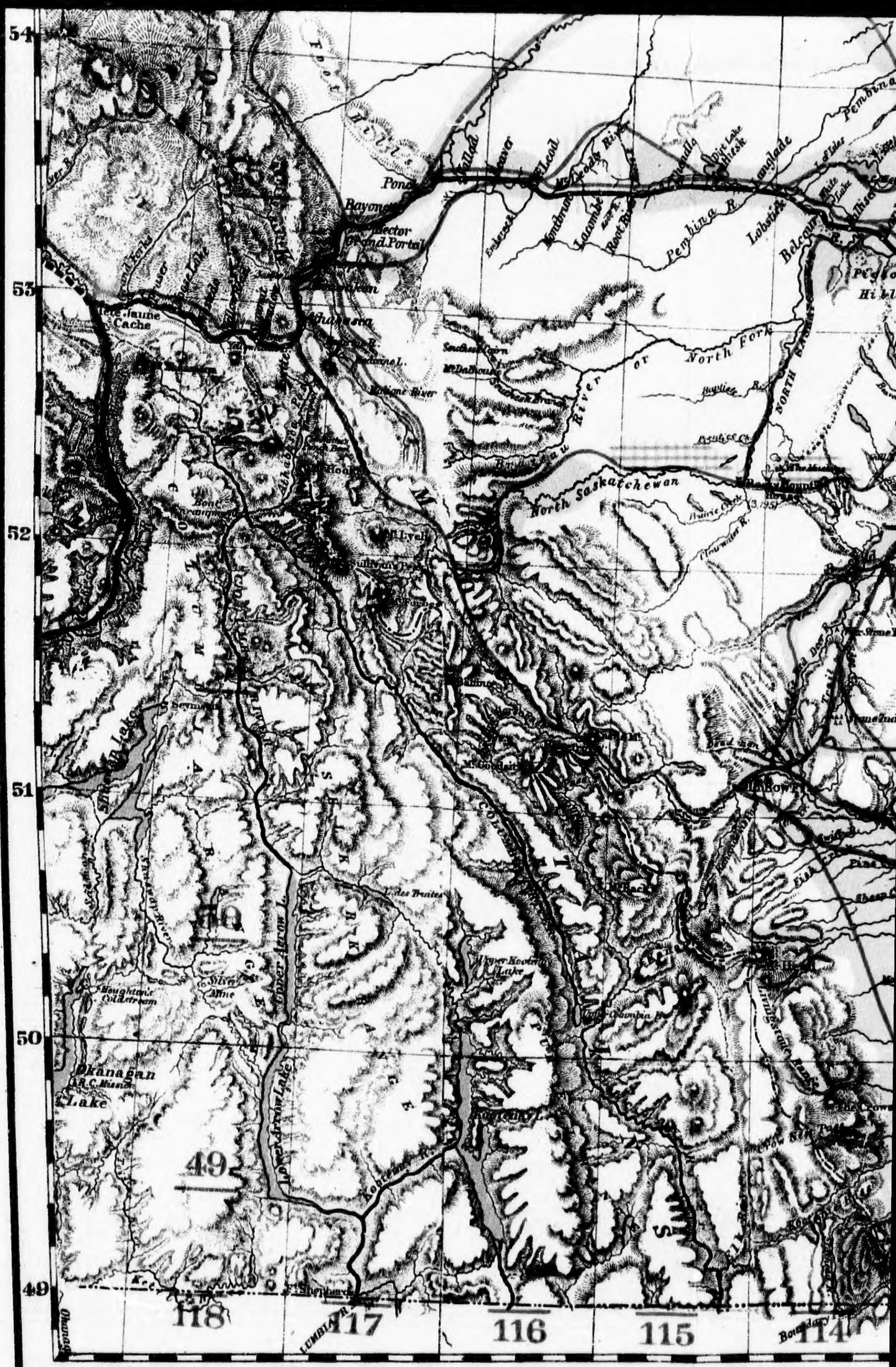
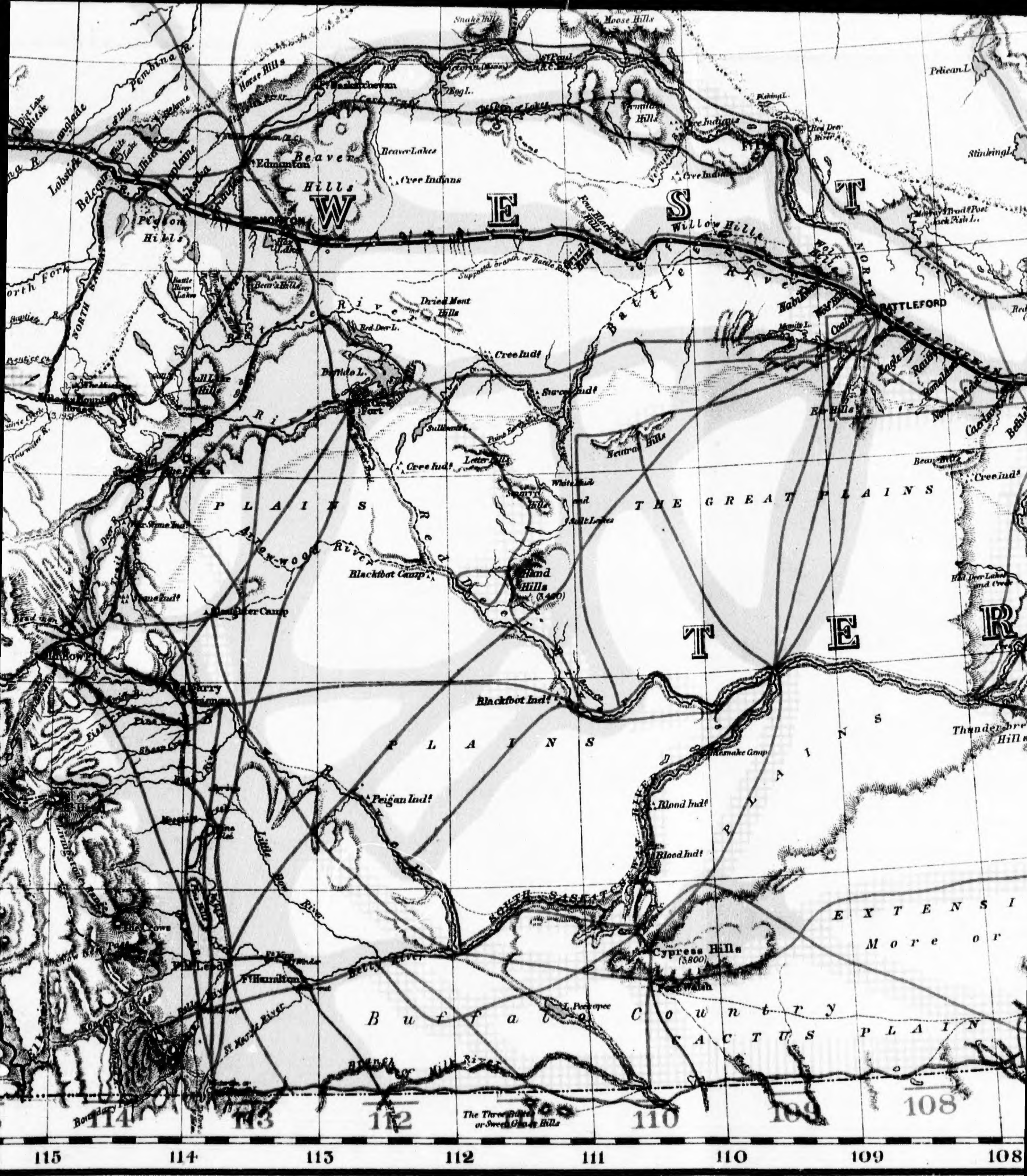


PHOTO-LITHOGRAPHED UNDER THE DIRECTION OF E. V. JOHNSON, DRAUGHTSMAN CANADIAN PACIFIC RAILWAY.



Snake Hills
Moose Hills
Pelican L.
Pembina R.
Horse Hills
Saskatchewan
Egg L.
Fishing L.
Edmonton
Beaver
Hills
Beaver Lakes
Cree Indians
Vermilion
Hills
Red Deer
Stinking L.
W
E
S
T
Lobstick
Belcourt
Peyton
Hills
Willow Hills
Four Blackfoot Hills
Supposed branch of Battle River
North Fork
Battle River Lake
Bear's Hills
Dried Meat
Hills
Red Deer L.
BATTLEFORD
Battle River
NORTH SASKATCHEWAN
Coal
Eagle Hills
Cree Indt
Buffalo L.
Sarcee Indt
Gull Lake
Hills
Elk Hills
Neutral Hills
Letter Hills
Cree Indt
Bear Hills
Cree Indt
PLAINS
THE GREAT PLAINS
White Mud
and
Salt Lakes
Arrow-wood River
Red Deer River
Blackfoot Camp
Hand
Hills
(3,400)
Slaughter Camp
T
E
R
Blackfoot Indt
PLAINS
Thunder
Hills
Rattlesnake Camp
Peigan Indt
Blood Indt
Blood Indt
PLAINS
SOUTH SASKATCHEWAN
EXTENSI
More or
Bow River
Belly River
Cypress Hills
(3,800)
Ft Walsh
Ft McLeod
Ft Hamilton
Buffalo Country
L. Pakowpee
CACTUS
PLAIN
St Mary's River
Branch of Milk River
The Three Buttes
or Sweet Grass Hills
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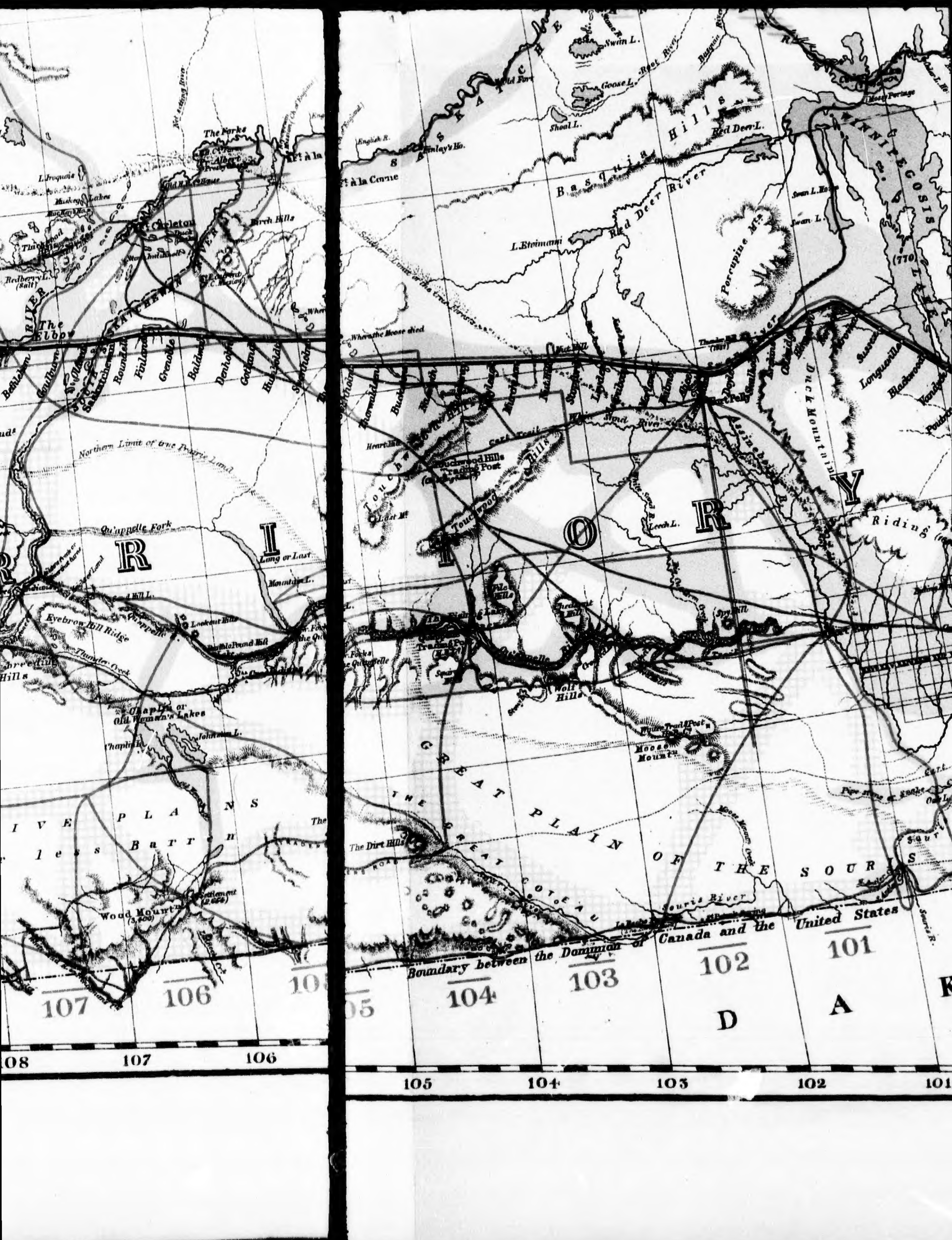

The Forks
L. Iroquois
Muskeg Lakes
Carleton
Birch Hills
Redberry L. (Salt)
RIVER
The Elbow
SASKATCHEWAN
Northern Limit of true Prairie Land
Qu'appelle Fork
R
I
Long or Last
Mountain L.
Eyebrow Hill Ridge
Lookout Hills
Thunder Creek
Hills
Chaplin or Old Woman's Lakes
Chaplin L.
Johnston L.
I V E
P L A
N S
less Barren
Wood Mount
Settlement
107
106
105
108
Swan L.
Goose L.
Root River
Shoal L.
Red Deer L.
Basquia Hills
Red Deer River
English R.
Finlay's Ho.
à la Corne
L. Etoimami
Porcupine Mts.
Swan L.
WINNIPEGOSIS
(770)
Where the Moose died
Heart Hill
Touchwood Hills Trading Post
Touchwood Hills
Last Mt.
O
R
Y
Riding
Leech L.
Assiniboine R.
Duck Mountain
Fort Pelly
White Sand River
Cart Trail
File Hills
Spy Hill
Wolf Hills
Moose Mountn
The Dirt Hills
GREAT PLAIN OF THE SOURIS
THE GREAT COTEAU
Souris River
Boundary between the Dominion of Canada and the United States
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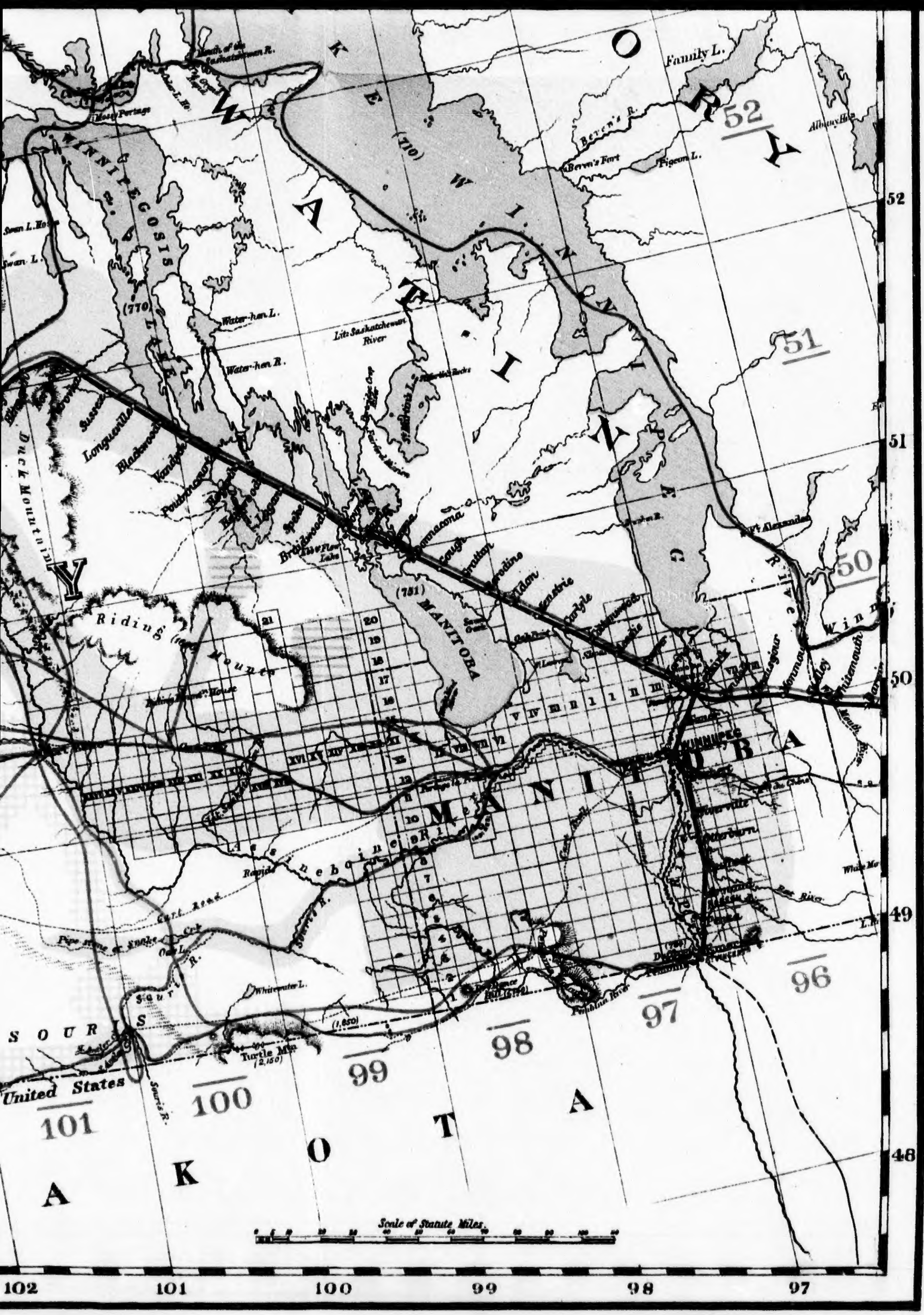

THE BURLAND DESBARATS LITH. CO. MONTREAL.